DEPARTMENT OF DEFENSE APPROPRIATIONS FOR 1960

HEARINGS

BEFORE THE

SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS HOUSE OF REPRESENTATIVES

EIGHTY-SIXTH CONGRESS

FIRST SESSION

SUBCOMMITTEE ON DEPARTMENT OF DEFENSE APPROPRIATIONS

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PART 6

RESEARCH, DEVELOPMENT, TEST, AND EVALUATION
LANGUAGE CHANGES
GENERAL PROVISIONS
STATEMENTS OF MEMBERS OF CONGRESS, INTERESTED ORGANIZATIONS, AND INDIVIDUALS

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UNITED STATES OF AMERICA

DEPARTMENT OF DEFENSE APPROPRIATIONS FOR 1960

TUESDAY, APRIL 14, 1959.

RESEARCH, DEVELOPMENT, TEST, AND EVALUATION

WITNESSES

HON. DONALD A. QUARLES, DEPUTY SECRETARY OF DEFENSE
HON. HERBERT F. YORK, DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING
HON. WILLIAM M. HOLADAY, DIRECTOR OF GUIDED MISSILES
ROY W. JOHNSON, DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY
MAJ. GEN. ROBERT S. MOORE, SPECIAL ASSISTANT TO THE ASSISTANT SECRETARY OF DEFENSE (COMPTROLLER)

Mr. MAHON. The committee will come to order.

We have before the committee this morning very important people whose work relates directly to the Defense appropriation bill.

We have Mr. Quarles, the Deputy Secretary of Defense; Dr. York, the Director of Defense Research and Engineering; Mr. Holaday, Director of Guided Missiles, and Mr. Roy W. Johnson, Director of the Advanced Research Projects Agency.

Mr. Secretary and gentlemen, for a long time it has seemed to me that we have needed to make a major effort toward better coordination throughout the entire Department of Defense in the field of research and development. In fact, I have advocated for years better coordination of the whole defense effort on all fronts. An effort toward coordination was, as I understand, the reason for setting up the new office of the Director of Defense Research and Engineering. Of course, there is always the danger that by imposing an additional layer of supervision, or review, we accomplish nothing favorable, and there is the possibility we might slow up programs generally and diffuse final responsibility. Therefore, it is important everyone understand clearly the authority of this new office and how it is to be organized and how it will work.

We are also anxious to learn from the Department of Defense just what the future holds for the Advanced Research Projects Agency and its relationship to the new Office of Defense Research and Engineering.

I hope that you and Dr. York can clarify these matters for us and give us guidance in our work here.

What is your proposed procedure here, Mr. Quarles?

Mr. QUARLES. Mr. Chairman, if it satisfies the committee, we would propose to make rather brief presentations that I think will tend to clarify some of the points that you have brought out. Having done so, we will be glad to answer any questions we can.

I might say at least it is our thought that Mr. Johnson's testimony on the program of the Advanced Research Projects Agency might

come separately and after the organizational discussion and the discussion of the research and engineering programs broadly. If that is agreeable, I have a rather brief statement about broad organizational and program matters, and Dr. York and Mr. Holaday will follow with their statements, all of which I think are complementary so that they do not cover the same ground. Then we might, if you agree, have questions on these broad areas, reserving Mr. Johnson's program for this afternoon.

Mr. MAHON. I think that that would be good procedure and an orderly way to approach this matter.

Mr. QUARLES. Shall I then proceed?

Mr. MAHON. You may proceed.

STATEMENT OF DEPUTY SECRETARY OF DEFENSE

Mr. QUARLES. Mr. Chairman and members of the committee, it is a pleasure to appear before you today and present information on the Department of Defense organization for research and engineering and a few highlights with respect to the development of our program in this area for fiscal year 1960.

I have with me Dr. Herbert F. York, the Director of Defense Research and Engineering; Mr. William M. Holaday, the Special Assistant for Guided Missiles; and Mr. Roy Johnson, the Director of the Advanced Research Projects Agency.

ORGANIZATION OF RESEARCH AND ENGINEERING ACTIVITIES

With respect to organization, I would like to explain the relationships now existing for research and engineering activities in the Office of the Secretary of Defense.

The Director of Defense Research and Engineering will supervise and coordinate all Department of Defense research and engineering programs. He will be responsible for providing effective leadership, eliminating unnecessary duplication, encouraging basic research, and developing an integrated research and engineering program covering all operational needs. The detailed responsiblities of his position are contained in Department of Defense Directive No. 5129.1, dated February 10, 1959, copies of which have been made available to the committee.

It is planned to continue the Advanced Research Projects Agency as an operating agency paralleling the research and engineering organizations of the military departments. The Director of this Agency will report to the Secretary of Defense administratively. However, his research programs will be subject to the supervision and coordination of Dr. York's office just as are those of the military departments.

ORGANIZATION OF GUIDED MISSILES PROGRAMS

In the guided missiles area we have had two different aspects. One has been to monitor and supervise all research and engineering work in the field of guided missiles, and the other has been to assure appropriate priority handling of all guided missile programs in the transition from research and engineering to quantity production. The research and engineering responsibilities of the former Director of Guided Missiles, together with the personnel involved, have been transferred

to the Director of Defense Research and Engineering. Over and above his assignment as Chairman, Civilian-Military Liaison Committee, Mr. Holaday will continue, in the capacity of a Special Assistant to the Secretary of Defense, to handle those special aspects of the guided missiles program which are beyond the research and engineering stage in order to assure priority treatment and maintain the momentum which the program has developed. Copies of the directive giving effect to this assignment have been made available to your committee. The arrangements I have described provide the framework within which appropriate actions may be taken to mold an effective research and engineering program which will not only meet immediate operational needs but also provide the springboard of technical knowledge so vitally needed to meet the requirements of the future.

BUDGET FORMAT

When Mr. McNeil appeared before the committee in February, he discussed the arrangement of the fiscal year 1960 budget. At that time, he indicated that the budget format and changes in appropriation structure are intended to facilitate presentation and consideration of the DOD budget and programs on a functional and more uniform basis than in past years. These changes do not in themselves give the Secretary of Defense any greater or lesser authority over the utilization of appropriations for military functions administered by the Department of Defense than he has now. The new groupings emphasize the functional rather than the organizational aspects of the budget, while at the same time maintaining the separate appropriation for each of the organizational components of the Department of Defense.

Some changes have been made in the content of appropriations included in Title IV: Research, Development, Test and Evaluation, which we are to discuss here today. As Mr. McNeil has previously stated, one of the improvements urged by the committee has been adopted—this is to differentiate more clearly between research, development, test and evaluation on the one hand, and procurement on the other. To implement this objective, changes have been made which result in increases in the more comprehensive R.D.T. & E. appropriations with corresponding decreases in the procurement-type appropriations. In addition, to the extent that amounts associated with development, test and evaluation remain in the procurement appropriations they are to be identified as separate budget activities. Dr. York will mention in some detail the amounts included in the budget estimates for the programs in these areas which total about $5.6 billion, of which over $3.7 billion is included in the R.D.T. & E. appropriations and more than $1.8 billion is separately identified in procurement appropriations.

Mr. FLOOD. I do not understand that sentence. Begin with "Dr. York." What is that now? Dr. York will what?

Mr. QUARLES. Will mention in some detail the amounts included in the budget estimates for the programs in these areas.

Mr. FLOOD. What do you mean by "these"?

Mr. QUARLES. In both the research, development, test and evaluation area, and the procurement type of appropriations relating to it;

The research and engineering programs have been examined critically, and certain of them, such as the POLARIS, PERSHING, and MINUTEMAN missiles, have been accelerated, and such items as the Navy's F–8U3 all-weather fighter, the Air Force RASCAL, GOOSE, and WIZARD missiles, and the Army's DART are to be phased out or terminated in favor of more promising developments.

SPACE PROJECTS

The National Aeronautics and Space Act, in creating the National Aeronautics and Space Administration, provides that the Department of Defense shall be responsible for—

> activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States (including the research and development necessary to make effective provision for the defense of the United States).

The program of the Department of Defense in this area has been drawn up in coordination with NASA and the Space Council as provided in the act. While it is thus possible to classify Department of Defense programs in this area as space programs, we believe it is more meaningful to regard them as military programs which only incidentally involve space. In our concept, each defense space project is thus considered on its merits in relation to other defense programs directed toward similar military objectives, rather than competing for funds with other militarily unrelated space projects. At the same time our program is carefully coordinated with the space research and exploratory work carried on by the National Aeronautics and Space Administration. The Secretary of Defense has assigned to the Advanced Research Projects Agency, for its direction and management through research and engineering phases, those space projects which have been incorporated in our program. Funds for these have been provided under the heading "Salaries and Expenses, Advanced Research Projects Agency." It is contemplated that when such projects reach the weapon system development and exploitation phase direction and management will pass to the appropriate military department.

Since research and development is such a rapidly changing field, we need to be able to exploit advances as opportunities are afforded. Flexibility in this area has been important in the past and will be even more important under the new organization. An emergency fund of $150 million and transfer authority of an additional $150 million is again requested.

The question—how much should we spend on defense research and engineering?—always involves difficult judgments. Since money alone will not assure progress, every effort must be made to use all available national, and even allied, resources so as to achieve optimum effectiveness. It is believed that the funds requested for fiscal year 1960 are adequate to continue, and that they are necessary to continue, the accelerated efforts already underway and that in areas now considered vital for national security they will assure that progress is paced by science and technology rather than by available funds.

Dr. York, Mr. Holaday, and Mr. Johnson will now provide the committee with information in their respective areas of responsibility and either they or I will be happy to respond to your questions.

Mr. MAHON. Off the record.
(Discussion off the record.)

MILITARY VERSUS CIVILIAN INTEREST IN SPACE PROGRAMS

Mr. FLOOD. I direct your attention to the sentence on page 4, which I consider to be of particular significance as between the Department of Defense and the entire Government and this committee and this program. I will quote it:

> The program of the Department of Defense in this area has been drawn up in coordination with NASA and the Space Council as provided in the act. While it is thus possible to classify Department of Defense programs in this area as space programs, we believe it is more meaningful to regard them as military programs which only incidentally involve space.

The gimmick to that is this space thing is getting all over the lot, and every committee of Congress from Post Office and Civil Service to Agriculture has acquired jurisdiction over space.

Mr. SIKES. Would you mind my saying "Amen"?

Mr. FLOOD. If you will put it in parentheses. I think it is about time that the people at the Department of Defense and this committee indicate—and the language of Mr. Quarles cannot be improved upon even by me—imagine that.

It is the first time that I have heard it said so well.

Mr. SIKES. And it is time that it was said.

Mr. FLOOD. It is certainly time that it was said. They say:

> We regard them as military programs which only incidentally involve space.

Mr. MAHON. Will you proceed?

PROCUREMENT FUNDS WHICH SUPPORT R. & D. PROGRAMS

Mr. QUARLES. Before Dr. York proceeds I wonder if I might comment on the financial matter a little bit a long the lines of your remarks off the record.

You directed attention to the division of these funds between the services, and in respect to title IV, the equal division is quite correct. It happens that in the funds from procurement that support this effort the division is quite unequal. I would just like to invite attention to the division of the roughly $1,845 million that is in the procurement account to support these programs.

This $1,845 million of procurement funds in support of the research, development, test and evaluation work is divided as follows: None to the Army; $281,600,000 to the Navy, and $1,563,600,000 to the Air Force, which means if one wished to look at a total of all funds from all appropriations supporting this kind of work the division of the funds would be just over $1 billion to the Army, $1,250 million to the Navy, and $2,700 million to the Air Force, where you have the very expensive aircraft and missile programs supported by these funds.

Mr. MAHON. The point is those funds of which you have spoken are in the appropriation for procurement of missiles and aircraft and so forth?

Mr. QUARLES. Yes.

Mr. MAHON. I think that your point is well taken.

You may proceed, Dr. York.

STATEMENT OF DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING

Dr. YORK. Mr. Chairman and members of the committee, it is a privilege to come before this committee again at this time in my new capacity as Director of Defense Research and Engineering; and to discuss the Department of Defense research and engineering program.

Since I was not appointed to my new position until after the fiscal year 1960 R.D.T. & E. program was submitted to the President, I did not participate in its development. Therefore, one of my major tasks has been to learn as much as possible about the fiscal year 1960 program as well as the programs for the immediate prior years.

BASIC PRINCIPLES IN DEVELOPING 1960 PROGRAM

For example, I have learned that two basic principles were observed in developing the fiscal year 1960 research and engineering program.

The first principle observed was to maintain a high level of effort for those projects considered to have the highest degree of essentiality; or to accelerate this effort where technologically feasible. The second principle observed was to either curtail or eliminate those projects of lesser importance or promise from an operational or technological point of view in order to conserve our resources for the support of our more important programs. Mr. Quarles has given you examples of the application of these principles.

There is nothing new about these principles but certainly one of my major supervisory functions is to see to it that these principles are observed in the selection of those projects which are to receive funding support.

Admittedly, it is difficult to exercise selectivity in the research and early development stages. Fortunately these phases are least expensive since these projects, even if continued and canceled later, do not involve major sums of money and invariably add to the store of knowledge which may be of benefit to other programs. However, major decisions must be made in the costly advanced development and early production phases, where a single item may not only involve an outlay of many millions of dollars but also may have a pronounced effect not only on military strategy but on the civilian economy as well. Therefore, it is highly essential that our resources not be dissipated by the pursuit of programs which do not offer real promise of payoff. Thus, the highest degree of selectivity must be exercised in reaching decisions to continue or discontinue the development of some of the major weapons systems. The Weapons Systems Evaluation Group, which is under the administrative direction of my Office, will, of course, be of major assistance in helping to arrive at these decisions.

REVIEW OF PROGRAMS

My Office has been and will continue to be engaged in a searching review of the proposed fiscal year 1960 R.D.T. & E. program so that by the time later on this summer, when the military departments and the Advanced Research Projects Agency submit their apportionment requests and the supporting program data, we will be in the position to quickly approve, disapprove, or modify programs and projects in accordance with the authority delegated to me by the Secretary of Defense.

DISTRIBUTION OF FUNDS

I would like now to turn to a discussion of the fiscal year 1960 R.D.T. & E. program. Since Mr. Quarles and Mr. McNeil have previously explained the changes leading to the establishment of the new R.D.T. & E. appropriation title, I will confine my comments to the distribution of the R.D.T. & E. funds and the nature of the programs under each of the budget classifications.

The distribution of the funds requested for fiscal year 1960 is:

[In millions of dollars]

Army (including AFSWP and NSA)	1,046.5
Navy	970.9
Air Force	1,149.9
Advanced Research Projects Agency	455.0
Emergency fund	150.0
Total	3,772.3

The distribution of the funds requested, less the $150 million emergency fund, according to the major activities of the new budget classification, is as follows:

Fiscal year 1960 budget

[Thousands of dollars]

Major activity:	
Military sciences	364,153
Aircraft and related equipment	496,310
Missiles and related equipment	1,407,768
Military astronautics and related equipment	309,150
Ships and small craft and related equipment	161,506
Ordnance, combat vehicles and related equipment	229,063
Other equipment	441,003
Programwide management and support	213,382
Total	3,622,335

It is difficult to determine the comparable figures for previous years but these are estimated to be about $2.3 billion in fiscal year 1958 and $3.5 billion in fiscal year 1959.

Now, I will discuss the nature of the programs under each of these activities and mention a few of the major items involved:

MILITARY SCIENCES

This activity includes basic research in the physical and life sciences, general supporting research of military importance, operations research, and the development of new materials, components, and techniques. This includes Army programs in chemical, biological, and medical research; research in fuels, materials, and propellants; food research, environmental research and studies; electronics research; personnel research; operations research; and logistics studies. Navy programs include research in a wide variety of the scientific disciplines, with particular emphasis on physics; operations research; research in training techniques; medical research; electronics research; and various programs for fuels, materials and propellants. The Air Force is the largest and includes such additional items as systems planning studies; considerable effort on flight medicine and related environmental studies; the operations and logistics studies conducted by

Rand; and the technical information exchange represented by ASTIA. The advanced research work of ARPA in the field of propellants and other work related to space programs and the research and testing programs of AFSWP are also included under this activity.

AIRCRAFT AND RELATED EQUIPMENT

This activity includes work on airframes, engines, armament, and communications, navigation, bombing, fire control, and other installed equipment. Major programs included for the Army are vertical and short-takeoff aircraft, including an aerial jeep, and related engine programs. The Navy has programs on new ASW and fleet air defense aircraft; airborne ASW detecting equipment; aircraft escape and survival devices; and specific programs in aircraft materials components and testing. The Air Force has such programs as the X–15 hypersonic research aircraft; the B–70, F–108, the boost-glide DYNA-SOAR, and major component work on the aircraft nuclear propulsion program.

MISSILES AND RELATED EQUIPMENT

This activity includes strategic, tactical, air defense, and special purpose missiles, test vehicles, and related equipment. Specific items covered include the Army's tactical PERSHING and SERGEANT missiles; the surface-to-air HAWK; and the antimissile system NIKE-ZEUS. The Navy has the solid propellant, submarine-launched POLARIS; the TARTAR and the EAGLE air defense missiles; and the CORVUS tactical missile. The Air Force has the liquid propellant ICBM's ATLAS and TITAN and the solid propellant MINUTE-MAN; the air-launched HOUNDDOG missile; the surface-to-air BOMARC; and the air-to-air FALCONS.

Mr. Holaday, of course, will present additional information on missiles.

MILITARY ASTRONAUTICS AND RELATED EQUIPMENT

This activity provides for the conduct of programs in space technology for military purposes and the investigation of specific applications of space vehicles. The Advanced Research Projects Agency is the primary sponsor of these programs and on specific assignment by the Secretary of Defense is conducting work on space projects of military interest, such as reconnaissance, communications, navigation, and early warning of ballistic missile attack.

SHIPS AND SMALL CRAFT AND RELATED EQUIPMENT

This activity provides for programs in the ships and small craft area. In the Navy this activity does not cover the procurement of ships but includes work on advanced engines and propulsion machinery; communications, data systems, detection, countermeasures, and other shipboard electronic equipment; catapults; arresting gear and other installed equipment. The Army has a very small program concerned with Marine craft for transport, reconnaissance, and assault use.

ORDNANCE, COMBAT VEHICLES, AND RELATED EQUIPMENT

This activity includes a wide range of weapons, ammunition, vehicles, and related items. The Army has the largest program, which includes the T–92 light tank, the T–95 series medium and heavy tanks, the T–195 and T–196 self-propelled howitzers, an air-transportable armored multipurpose vehicle family, Goers type trucks, the Vigilante light AA weapons system, LITTLE JOHN rocket and launcher, Davy Crockett battle group weapons, numerous small arms and ammunition improvements, and various CW and BW munitions developments. The Navy program emphasizes antisubmarine weapons and includes mines, depth charges, torpedoes, bombs, rockets, and related items such as RAT, ASROC, SUBROC, and ASTOR. Specialized weapons and support vehicles for the Marine Corps are also provided. The Air Force program is concerned with ammunition, rockets, bombs and related components, such as an improved Genie air-to-air rocket and a number of fuze other related aircraft armament and ammunition components.

OTHER EQUIPMENT

This activity includes a wide variety of equipment not specifically identified with the other activities discussed. Army programs include telecommunications equipments, radio communications equipments, electronic countermeasures, combat surveillance equipments; materials handling equipment, clothing and shelters, food and container items, construction machinery, mine detectors, bridges, mapping and geodetic equipment, and nuclear powerplants. Navy programs include navigation, detection and warning equipment, harbor defense equipment, shore-based antisubmarine and mine countermeasures systems, clothing and oxygen equipment, and photographic equipment. The Air Force program includes the work at Lincoln Laboratories in air defense equipments, data handling equipment, aircraft control and warning equipment, various photographic equipments, and the Air Force communications system. The equipment development of the National Security Agency are also included under this activity.

PROGRAMWIDE MANAGEMENT AND SUPPORT

This activity provides for the operation, management and maintenance of research and engineering facilities of the Army, Navy, Air Force, and ARPA which are not distributed directly to the other budget activities. This includes administrative and staff services, maintenance and upkeep of buildings and grounds, utilities, maintenance of administrative equipment, supply services, and other installationwide services not directly chargeable to specific projects or programs.

PROGRAMS SUPPORTED BY PROCUREMENT FUNDS

In addition to the above programs, I have responsibility for the separately identified items of a development, test and evaluation nature, still carried in the "Procurement and production" appropriations by the Navy and the Air Force. These programs involve a total of $1.8 billion for fiscal year 1960 as Mr. Quarles and Mr. McNeil have told you. Some of the major items thus supported by

the Navy are the POLARIS, CORVUS, and EAGLE missiles, aircraft engines, certain ordnance items, combat vehicles and related equipment. Navy separately identified items amount to almost $282 million. In its separately identified account amounting to $1.6 billion, the Air Force is supporting such items as the B70, F108, B58 and early warning aircraft plus such missiles as the TITAN, ATLAS, MINUTEMAN, and BOMARC.

EMERGENCY FUNDS

I agree with Mr. Quarles that the continued provision of an emergency fund of $150 million, plus transfer authority of an additional $150 million, is considered necessary to provide funding flexibility for exploiting other highly important programs as the need arises throughout the fiscal year. This funding flexibility has proved invaluable in the past and is expected to be even more helpful in the future with the acceleration of timetables and the resulting probability of advances requiring increased emphasis or sudden changes in emphasis.

Other Government agencies, such as the Atomic Energy Commission, the National Aeronautics and Space Administration, the Federal Aviation Agency and the National Science Foundation, are doing or sponsoring work which relates to the defense effort. Private industry is also spending increased sums for research and engineering in many fields where the results can be used for military as well as for civilian purposes.

I believe that all of these efforts add to a very substantial program of research and development for the Department of Defense and the Nation as well. I believe further that fiscal year 1960 R.D.T. & E. program of the Department of Defense is needed to provide the diversification and depth required to meet the needs of our military forces.

STAFF OF DR. YORK

Mr. BOYLE. May I inquire as to the size of the staff the good doctor needs in order to handle this very ambitions program? Will there be something on that?

Dr. YORK. I can answer it now or at any time you prefer.

Mr. MAHON. Answer briefly now.

Dr. YORK. There will be approximately 210 people on my immediate staff in the Pentagon. There are two other small groups which work closely with us on some of these matters. There are now about 160 or 170 on my staff.

Approximately two-thirds of these are professional people of one kind and another.

Mr. BOYLE. What about the subsidiary groups?

Dr. YORK. There are two. One of those is a group for the mutual weapons development program in Europe, and that is a group of 20 who monitor this program.

The other is approximately 100 technical people, both civilians and military, who are the Weapons Systems Evaluation Group and who work primarily for the Joint Chiefs of Staff. This is a service provided by us for the Joint Chiefs of Staff.

They also work to a small extent on problems we give them.

Mr. MAHON. Do you work closely with the Weapons Systems Evaluation Group?

Dr. YORK. Yes. That is administratively under my office. That is why I mentioned this number of people. It is approximately 100 technical personnel.

Mr. MAHON. Proceed, Mr. Holaday, please.

STATEMENT OF SPECIAL ASSISTANT TO THE SECRETARY OF DEFENSE FOR GUIDED MISSILES

Mr. HOLADAY. Mr. Chairman, members of the committee, I appreciate this opportunity to appear before you to discuss the role which I have with respect to the national guided missiles program. I should say, we have very recently completed the transfer of the R. & D. activities on guided missiles to the Director of Defense Research and Engineering. Effective April 8, 1959, I became a special assistant to the Secretary of Defense in the guided missiles field, in which I will be interested in providing an orderly transfer from the research and development phases into the production and procurement phases, and will monitor the production and procurement phases. It is recognized that in some cases Dr. York and I will have concurrent interest in specific projects for different aspects of the projects due to the overlapping of development and production.

NUMBER OF GUIDED MISSILE PROGRAMS

The guided missiles program now has a total of 41 missile projects aimed at meeting specific service requirements. In 20 projects it appears that the interest in the research, development, test and evaluation phases is predominant. In the balance it appears that the interest is predominant in the production and exploitation phase. I have attached a table showing the various projects and predominant area of interest.

STATUS OF BALLISTIC MISSILE PROGRAMS

In view of the interest in ballistic missiles I would like to comment briefly on the status of these programs. We are making extremely good progress. Both the THOR and JUPITER missiles have demonstrated their ability to hit a specified target. The THOR is being deployed to the United Kingdom and we expect to deploy the JUPITER to Italy as fast as we are able to make arrangements and move the equipment over there. It should be pointed out that both of these programs, were completed in about 3 years. Both are complex weapon systems and this development period represents the shortest time required for any fully developed missile now in or about to enter operational use. We feel that the achievement of the development objectives of these two programs is a real demonstration of the capabilities of our scientists and engineers. Because of the lengthy negotiations associated with the deployment of these missiles, we have tentatively decided to limit our total THOR-JUPITER force to a to a total of 8 squadrons (120 missiles)—5 squadrons of THOR and 3 squadrons of JUPITER.

In addition to the THOR and JUPITER intermediate range ballistic missiles, we have, as you know, the submarine launched POLARIS

intermediate range ballistic missile. The POLARIS is now entering the flight test stage. The POLARIS has had five flight tests, of which one was unsuccessful and four partially successful. While we encounter some difficulties in the development program, we can say at this time that we have not encountered any major problem areas which give us cause for concern as to the POLARIS becoming an effective submarine launched ballistic missile system.

In the intercontinental range program, we have the ATLAS, TITAN, and MINUTEMAN programs. The ATLAS program is proceeding on schedule and is performing better than many of us would have expected for a truly first generation missile. The test program is proceeding well; the problem areas are becoming identified and solved; and the first operational launching complex at Vandenberg Air Force Base will become available this year.

The TITAN intercontinental ballistic missile is approximately 2 years in back of the ATLAS in terms of its timescale and is in the early stages of its flight testing. It should be noted that the first three flights of the TITAN missile met their desired test objectives.

The final missile I wish to discuss is the MINUTEMAN solid propellant intercontinental ballistic missile. In considering the MINUTEMAN and its proposed characteristics, it should be noted that MINUTEMAN is specifically planned to be a second generation intercontinental ballistic missile, taking into account all possible advances in the state of the technical art. It is important, therefore, in considering any potential acceleration of the MINUTEMAN program that such acceleration, if undertaken, does not result in a missile having degraded characteristics which would make it less desirable from an operational standpoint. Accordingly, we are fully supporting the MINUTEMAN program and intend to have it proceed toward achieving the earliest practicable operational date. Care will be exercised to avoid compromising the desirable features of the proposed MINUTEMAN system. Coming in a later time frame, we expect the MINUTEMAN will combine with the ATLAS, TITAN, and POLARIS systems in giving us adequate flexibility and presenting in its time period a more positive deterrent to a potential aggressor.

Now, with respect to the rate of buildup of the ballistic missile programs, we are conducting a series of studies in cooperation with the services to determine whether a higher rate of buildup is feasible, practicable, and required. The Joint Chiefs of Staff have assured us the present overall force structure appears to be adequate. On the other hand, the services have indicated that a faster rate of buildup might be achieved in the ATLAS, POLARIS, and possibly the MINUTEMAN programs. We are, therefore, reviewing the ballistic missile programs, keeping in mind the following factors:

(1) Ability to kill the target as determined by warhead accuracy/yield relationship;
(2) vulnerability of the proposed system to enemy attack;
(3) reliability;
(4) costs;
(5) manpower requirements;
(6) reaction time;
(7) relationship to other programs and forces in being.

In summary, the ballistic missile programs are meeting development and deployment schedules and we are continually reviewing

these programs to determine the desirability and feasibility of improving our own military posture by shifts within these programs.

EFFECT OF REORGANIZATION ON SERVICE RIVALRIES

Mr. MAHON. Gentlemen of the committee, I suggest that we undertake to direct our questions to Mr. Quarles insofar as we may wish to interrogate him in order that we may not keep all of our principal witnesses throughout the hearing. I do not believe that is necessary and it would be poor use of manpower.

Mr. Quarles, I will direct a number of questions to you.

Just prior to the enactment of the recent reorganization legislation a great deal was written and said about rivalries among the services. The reorganization of the Defense Department strengthened the Joint Chiefs of Staff and was expected to eliminate some of this rivalry.

It appears that much of this rivalry for roles and missions has its inception in the development of weapons for those particular roles and missions, such as the long-range missile program.

Do you agree with that premise or idea? If you do agree, do you expect that this new setup for coordinating research and development will head off potential service rivalries in the research and development stage of the operation?

Who will make the final decisions in this regard?

Will you give us an overall comment on that?

Mr. QUARLES. Yes, Mr. Chairman. First, I would say that I do agree. I think the reorganization moves which were made beginning more or less a year ago and completely effected as of the beginning of this calendar year are very important in the direction that you have mentioned.

Commenting first on the command structure and the JCS organization, I would say that by placing the unified and specified commands under the Secretary of Defense, with the Joint Chiefs of Staff staffing the operations of these commands, we have moved toward integration of the forces and away from departmental handling of the command of the forces, and by doing so we have relieved one of the areas of departmental rivalry.

In the area of research and development, some important things have been done in this same direction. The establishment of Dr. York's office, Defense Research and Engineering, has given a firmer centralized leadership and management to this part of the program, and through that kind of management it will make it possible to relate the programs of the three Departments to each other and to the whole more effectively, and by doing so again will discourage improper use of the research and development program as a means of carrying on a kind of warfare between the Departments in an attempt on the part of each to enlarge its area of roles and missions.

I would point out, as I am sure the committee is aware, the fact that some degree of this rivalry between the departments is wholesome and productive.

However, if it gets out of bounds it is certainly not of that quality, and our job in Defense is to see that it does not get out of bounds.

Another important factor here is in the creation of the Advance Research Projects Agency to whom the Secretary of Defense has

assigned a number of research and exploratory projects in the space field, but not limited to the space field. By making such an assignment, an area which could have been very controversial as among the three departments has been pulled together directly under the Office, Secretary of Defense management, and by doing so I am sure we have relieved that area of considerable bitter rivalry that would otherwise have plagued it.

I would say that these organization moves have collectively been very important in the direction of bringing the service programs into a coordinated whole, and one definition of a coordinated whole is that there should not be unwholesome rivalry as between the services in the formulation of the program.

Mr. MAHON. The way the long-range ballistic missiles program was handled in the past, it seems to me, it had a considerable part in the frustration which apparently arose in the mind of General Gavin, who is no longer in the Army.

It appeared to me that the Army made a very strong pitch for the IRBM and the ICBM missile as a weapon of the Army, and the Army having lost in that effort was somewhat frustrated, at least some people in the Army were.

Is the system which we are using now sufficiently different to prevent that sort of thing from recurring?

Mr. QUARLES. I believe it is, Mr. Chairman; at least, if not to prevent it it will be a very strong deterrent, and I would hope it would in fact prevent it.

In the case of the ICBM, for example, its operational use is assigned to the Strategic Air Command.

The Strategic Air Command is a specified command under the Joint Chiefs of Staff. It happens to be manned and provisioned primarily by the Air Force but it could be provisioned in part by the Navy, and, in fact, by the Army so far as that is concerned, and still be a specified command under the Joint Chiefs of Staff.

IRBM DEVELOPMENT

At the time the intermediate range program was established, the Army had an important facility at its Redstone Arsenal, and it seemed wise, since we were trying desperately to buy time in that program, to set up parallel programs, one in the Army and one in the Air Force.

Actually, originally it was a joint Army-Navy program, on the one hand and an Air Force program on the other. This, you might say, deliberately invited rivalry between the two services in the interest of buying time.

In retrospect one might imagine a better way of playing that game, but I think the decisions were wisely taken at the time, and I think we may all take very great satisfaction in the success of this intermediate range ballistic missile program, including the very remarkable time schedule which we met.

Mr. MAHON. Even though we find difficulty in utilizing fully the potential which we developed in the IRBM field, because we do not particularly need it, and our allies have, generally speaking, been reluctant to accept it.

Mr. QUARLES. There has been something less than the originally planned use for it. Perhaps I should even say there is something less than original enthusiasm for its use.

On the other hand, Mr. Chairman, I think it has been a very important weapon, and we may be looking a little bit too much at the trees in this situation of the problems in each one of these countries and not seeing the forest of its great deterrent value and great psychological value, which I think are very real.

Mr. SIKES. Mr. Quarles, did it not in fact serve as an intermediate weapon in availability as well as in range? We were able to develop it ahead of the long-range weapons. It gave us a valuable weapon before we had a longer range weapon. Frankly, I think it has paid its way, whether we ever use it or not.

Mr. QUARLES. That would be my view, and I think that view is held generally by our military experts and leaders.

Mr. SIKES. Had emergencies developed our allies would have been much more interested in using it than they are at present, I think.

Mr. QUARLES. That is true. The thing we must realize is that our allies became aware of the fact that the Soviets were deploying weapons of this kind against them during this period.

Had we been without any counterpart to their weapons, the situation psychologically would have been very different.

Therefore, as Mr. Sikes said, I think there are very important values here which we should not overlook.

Mr. MAHON. Dr. York was about to add something, I believe.

Dr. YORK. It has formed, as Mr. Johnson will point out, the backbone of our space program, also, the DISCOVERER series and many others all depending on the IRBM boosters.

Mr. FLOOD. That was the point I would like to have made.

I would like to make this clear, also, Mr. Chairman: That General Gavin and the Army at no time pressed for jurisdiction on any ICBM. They did discuss the tactical and strategic value as an Army weapon of the IRBM because of their interest in the development of the JUPITER missile.

However, they very soon abandoned any plea for tactical jurisdiction on the IRBM, and the Army program was and still is, and in my opinion should continue to be, demanding and insisting upon technical jurisdiction, first, for such a ballistic weapon up to 500 miles; and, secondly, for spotting liaison aircraft to 10,000 pounds and necessary drones to take jurisdiction over a 500-mile ballistic weapon; and also, or, on the other hand, the BOMARC. That is the Army position.

Never was tactical or strategic jurisdiction operationally over any ICBM brought up.

Mr. MAHON. I have no desire to bring the Army in an improper light. Some argued that an IRBM was nothing more than an extension of artillery, and that argument was not without logic, and the ICBM also was nothing more than an extension of artillery.

Mr. FLOOD. That was only discussion but there was never any desire on the part of the Army to get beyond 500 miles.

ORGANIZATION OF SPACE PROGRAMS

Mr. MAHON. The subject of service rivalries brings to mind another question in this area which I believe has not been fully resolved. This is the rivalry among the services, agencies, and so forth in our space effort.

I remember reading in the press about a hearing over in the Senate, perhaps before the Preparedness Committee of Senator Johnson, as to who really was the top man in space decisions. This thing I believe was resolved at the hearing, or at some later time.

What is that situation, Mr. Secretary?

Mr. QUARLES. I believe it has been resolved, Mr. Chairman. Of course, in the Defense organization the Secretary of Defense is ultimately responsible for decisions.

In the area of research and development, including missiles and space, he has his Director of Defense Research and Engineering responsible to him, of course, but nevertheless carrying the responsibility in a staff sense for decisions in this area; so Dr. York, in the technical program, is the Secretary's of Defense chief and in your sense highest advisor.

In the execution of the program the Director of Advanced Research Projects Agency is responsible in an operational sense and administratively reporting to the Secretary of Defense exactly the way the Secretaries of the military departments report to him with similar responsibilities, but the programs of all are the technical staff responsibility of the Director of Defense Research and Engineering. I think these relationships have now been clearly established by the directives that have been issued.

Mr. MAHON. When was this problem well defined and delineated by appropriate directives?

Mr. QUARLES. In February, I believe, all were finally issued. The timing here was that they needed to await the taking effect of the new organization which was finally done the first of the calendar year, and they needed, so far as Defense Research and Engineering is concerned, to await the presence of Dr. York on the job, so he could take part in the organization of the group as the new Director of Research and Engineering. But they were issued promptly when conditions permitted them to be issued and were to the effect that I have described.

Mr. MAHON. How does the Director ARPA fit into this management picture?

Mr. QUARLES. The Director of ARPA reports administratively to the Secretary of Defense and has by delegation from the Secretary of Defense responsibility for execution of specific advance research programs, largely in the space area but not exclusively so.

The programs which are so assigned to ARPA have been coordinated with and are, in fact, part of the Defense Research and Engineering program as a whole for which Dr. York is responsible.

Mr. FORD. In the last session of the Congress, in 1958, Mr. Quarles, I was a member of this Select Committee on Space and Astronautics. We struggled in the preparation of the basic civilian space program with language seeking to delineate the areas where the military and the civilian programs should be separated. It was and is a terribly gray area. Nobody could come up with words that were satisfactory to all parties.

We came up with the language which is set forth in your prepared text on page 4, which is as follows:

> Activities peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States including the research and development necessary to make effective provision for the defense of the United States.

Although we were trying to write a space law for the civilian side, I think the consensus was that most members of the committee were interested in protecting the military side so there would be no roadblock in the effort for national security.

What has been the result of that language, how has it operated, and should it be changed? Do you have any problems? What is the situation?

Mr. QUARLES. Mr. Ford, I think that that is a very happy choice of language in the act. Of course, in any matter of this kind various organizational arrangements are possible.

I think it was wise to reserve to the Department of Defense responsibility for those aspects of what might be called a space program which are, in fact, military weapons systems and Defense projects, and just for reasons that we discussed a little earlier I think the fact they happened to get out into space at times, or even if they stay in space all the time, is a secondary thing and that the important point is that they be properly related to the Defense program as a whole, the weapons systems programs as a whole, and that they meet the competition of other methods of accomplishing the same military purposes that they seek to accomplish.

I believe that this language has made it possible to achieve a sound division of the program, the new program, between the National Aeronautics and Space Exploration Administration and the Department of Defense, and while no organizations as big as these two and growing as fast as the space organization has grown could be without some tensions and difficulties, my own feeling is that these have been very satisfactorily resolved and that we are working effectively hand in hand with the Space Administration, which is exactly the way we should work and have always worked with the National Advisory Committee for Aeronautics which they succeeded.

Mr. FORD. I wonder if I might ask Mr. Johnson to comment on that, Mr. Chairman? I presume his area is the one which would be most in conflict, if it is in conflict, with the NASA group.

Mr. MAHON. Very well.

Mr. JOHNSON. Mr. Ford, yes, I agree completely with what Deputy Secretary Quarles has said. There have been tensions; there have been decisions of transferring projects from the Department of Defense to the National Aeronautics and Space Administration to which some of our own technical people within ARPA have objected.

I am not one of these objectors on the assumption that the programs transferred will be pursued vigorously. The day they are not pursued vigorously I will go to the Secretary of Defense and ask for action.

To date this has not been necessary, and therefore I am satisfied with what has been transferred to that agency as an assignment for them to execute.

Mr. FORD. As I recall the law it provided for a Military-Civilian Liaison Committee.

As I also recollect it, the Chairman was to be someone from the Department of Defense in that Liaison Committee.

Am I in error on the last point?

Mr. QUARLES. I think only on that very last point. I believe the law was silent on the question of where the Chairman should come from, but he would be recommended by the Secretary of Defense and the Administrator of NASA, and appointed by the President, as I remember the law; certainly we operated that way.

As you know, Mr. Holaday was designated as the Chairman of that Civilian-Military Liaison Committee.

Mr. FORD. Has that Liaison Committee worked out satisfactorily? Is it functioning?

Mr. QUARLES. Would it not be best to ask Mr. Holaday to respond to that?

Mr. HOLADAY. Mr. Ford, we have been functioning under the rules and regulations of the law, which I believe we will have to admit is somewhat vague.

We have held our meetings, four of them. There are Department of Defense members on the Committee. Mr. Johnson here is one of the Department of Defense members, and there are members from the Army, Navy, and Air Force.

There is an equal number from the NASA.

The part we have been taking is acting as one means of exchange of information. If you will read the reference for the Committee it is to act as a means of exchange of information.

In doing this we have had the meetings in which the various programs conducted by NASA and by ARPA have been reviewed.

In reviewing these things it has brought up some need and some points for showing that they should perhaps work a little closer together as groups in developing one program; for instance, the tracking part of the program. I am sure Mr. Johnson will discuss this this afternoon. DOD and NASA were required to get together, figure out what would be required for tracking, and how they were going to get the equipment installed.

These are the kinds of activities we have been carrying forward up to the present time. We have had no major problems sent to us to try and resolve.

This may come at a later date.

Mr. MAHON. This discussion of words which apparently has been rather apt in the law is very interesting.

The Good Book says that words fittingly spoken are like actions of gold and silver. Let us hope that these words are such.

I have before me a clipping from the Washington Post and Times Herald dated Monday, February 9, 1959. I will quote from this article.

> Between teeth clenched on a soggy cigar, Gen. Nathan Twining gave this terse opinion of the rival bureaucrats claiming jurisdiction over outer space: "They are a bigger threat than the Russians."

Mr. SIKES. Are you speaking of that particular newspaper, or the testimony, as being a bigger threat than the Russians?

Mr. MAHON. End quote.

The setting for that was February 9, 1959. Some of your directives have been issued since that time, I believe.

Of course, you know General Twining was not the only one who was concerned with this problem.

You have discussed this matter somewhat. Do you think you can add anything to this? Do you think this situation which apparently brought on a state of frustration in the mind of the Chairman of the Joint Chiefs has been rectified?

Mr. QUARLES. It is fair to say that it has, Mr. Chairman. All of these directives that I referred to were discussed before the Armed Forces Policy Council of the Secretary of Defense in which not only General Twining as Chairman, JCS, participated but all of the Chiefs of Staff of the services are members. All of these directives were unanimously recommended by that body to the Secretary of Defense for his signature, so I believe that there is no organizational area here on which General Twining would comment.

It would be better that he speak for himself, of course, but that is my impression.

Mr. MAHON. Do I get from you the implication that the condition has somewhat changed since February 9 when this statement was made?

Mr. QUARLES. I think it surely has; yes.

EFFECT OF ADMINISTRATIVE DELAYS ON SPACE PROGRAMS

Mr. MAHON. Have there been delays in any of the space programs while decisions were being made regarding responsibility for the work?

Mr. QUARLES. I feel that there have not been. That is always a difficult question to answer because one must take time in selecting and deciding what is important to do and what one has time and available techniques to carry out, so that time spent in that kind of planning I would regard as an essential part of the program time.

If one allows that, then I would say there has not been any loss of time due to administrative delays.

Mr. MAHON. Do you have any comment on that question, Mr. Holaday?

Mr. HOLADAY. No. I think I would concur with Mr. Quarles. Having gone through this space program in its various changes now over the 3 years, I do not believe we have had a delay. Actually we see lots of discussion having taken place on things, but when we finally got a program you could see that it has been a very straightforward development step getting to a program that was sound and basic and that we can really carry it out. I would have to conclude that there has not been any delay.

Mr. MAHON. Do you have any views different from that, Mr. Johnson?

Mr. JOHNSON. Mr. Chairman, absolutely not. I believe the space program was pursued so vigorously that no one can complain. With your permission, I would like to submit a chronology of exactly what happened from the date, February 12, when ARPA was created within DOD, up to the present point. I think this chronology of action clearly indicates that this was one of the speediest programs funded and approved and executed, that we have had in recent years within the DOD.

Mr. MAHON. We will include the statement at this point in the record.

Mr. JOHNSON. Thank you.

(The statement referred to follows:)

A Chronology of Major Advanced Research Projects Agency Decisions in the Fields of Military Space Technology, Ballistic Missile Defense, and Solid Propellant Chemistry

February 1958–March 1959

The Advanced Research Projects Agency (ARPA) was established February 7, 1958, to manage various research projects vital to our national security. The responsibility for operation and management of the ARPA organization and effort has been assigned to a small management team of 27 civilian and military personnel, excluding secretarial and clerical assistants. To provide the necessary scientific and secretarial guidance, a contract was entered into with the Institute for Defense Analyses on March 15, 1958. At present there are 34 persons, excluding clerical and stenographic, assigned to this organization. The Chief Scientist of the ARPA organization also serves as head of the IDA office.

ARPA projects in the area of space technology have represented a major portion of all effort expended. Other areas involving projects covered, assigned by the Secretary of Defense, are ballistic missile defense and solid propellant chemistry. In the early months of its existence, ARPA was primarily concerned with direction of the scientific space endeavors including the VANGUARD and EXPLORER satellites and the lunar probes. These projects were transferred to NASA in October 1958 coincident with the establishment of that organization. A chronology of all ARPA activities resulting from major program decisions made since February 1958 follows:

I. MILITARY SPACE TECHNOLOGY

1. JUNO I explorer satellite and JUNO II lunar probes

In March 1958, a decision was made to proceed with four launches using Army's JUNO I and JUNO II vehicles. Later, this number was expanded to eight. EXPLORER III was successfully launched on March 26, 1958, and EXPLORER IV was placed in orbit on July 26, 1958. The EXPLORER II and EXPLORER V launches in March and August of 1958 were unsuccessful. The remaining firings in this schedule were transferred to NASA in October 1958.

2. Air Force lunar probes

On March 27, 1958, ARPA directed the Air Force to proceed with the necessary preparations for three lunar probes. The launch vehicle was to consist of a THOR first stage, a VANGUARD second stage, and a solid rocket third stage. The first launch on August 17, 1958, was unsuccessful. Preparation for the second and third launches was nearing completion when the project was transferred to NASA. The project for providing a ground scanning system for use in the lunar probe program was likewise initiated in March 1958 by ARPA and transferred to NASA in October.

3. Tactical cloud cover satellite

In April 1958, ARPA directed the U.S. Army Ordnance Missile Command to proceed with a program which objective is to investigate the utilization of television techniques as part of a satellite program for obtaining weather data. Reliable weather information is needed for a variety of military operations. This program was separately identified in an ARPA order issued July 25, 1958. In December 1958, the decision was made to transfer this program to NASA, effective July 1, 1959.

4. Satellite detection fence

The decision was made in June 1958 to modify the Minitrack tracking system techniques to an active mode capable of detecting, identifying, and orbit-predicting of nonradiating objects in space. This work is being accomplished through the Naval Research Laboratory. As a part of this program, an ARPA order was issued to the Ballistic Research Laboratories to establish a Doppler system complex to operate in cooperation with the active Minitrack system. The combined coverage of the Minitrack-Doppler fence will provide requisite information on all nonradiating objects in space. The western complex of the combined system is now considered fully operational. The passive Minitrack system was transferred to NASA as an integral part of the VANGUARD program in October 1958.

5. Large engine programs

(*a*) *One-million pound thrust single-chambered engine.*—In December 1957, the Air Force initiated advanced design competition on this engine. In May 1958, an ARPA-Air Force evaluation was completed and, on June 23, 1958, the Rocketdyne Division of North American Aviation was selected for the preliminary design of a million-pound thrust chamber. In October 1958, NASA assumed responsibility for this program, and on December 17, 1958, after a period of expanded negotiations, announced a contract with North American for design and development of an engine of 1 million pounds thrust capable of being developed to 1,500,000 pounds thrust.

(*b*) *One and one-half million pound thrust clustered engine.*—Because of the urgent requirement for boosters capable of placing large payloads into orbit at an early date, a decision was made in August 1958 to develop an engine of 1.5 million pounds thrust using a cluster of available rocket engines. The immediate goals in this program are to achieve a full scale dynamic firing by the end of calendar 1959 and a propulsion flight test of the booster in 1960. The clustered engine is expected to be operational several years before the single-chambered engine. The clustered booster, combined with an ICBM and a high energy upper stage (item 8, below), will be capable of placing 30,000 pounds in a 300-mile orbit, impacting 7,000 pounds on the moon or placing 4,000 pounds in a 24-hour orbit. The clustered engine, utilizing the NASA-developed 1.5 million pound engine as a central element of the cluster, would have a combined thrust of 2.3 million pounds. During the course of this program, a technique will be developed for recovery of clustered boosters for study and for possible reuse in subsequent launches.

6. Sentry program

On June 30, 1958, an order was issued whereby ARPA assumed responsibility for the Sentry program. The primary purpose of the Sentry program is to obtain military information vital to defense planning.

7. Project Score

In August 1958, a decision was reached to place a payload into orbit containing communications equipment capable of receiving, storing, and retransmitting messages. This project was successfully accomplished on December 18, 1958, by use of the ATLAS vehicle.

8. High energy upper stage

In August 1958, the Air Research and Development Command was directed by ARPA to develop an added high energy fuel stage to be used with ATLAS or TITAN boosters. Later, this stage will be used with the 1.0 million and the 1.5 million pound boosters. Liquid hydrogen and liquid oxygen will be used to obtain the desired thrust. In December 1958, the decision was made to transfer this program to NASA, effective July 1, 1959.

9. Navigation satellite

Based on the need for an instantaneous, all-weather, precise system for determining position at any point on the globe by passive means, ARPA issued a directive to the Navy Bureau of Ordnance in September 1958. This directive calls for research and investigation into the refinement of Doppler techniques leading to a satellite Doppler navigational system which can provide navigation data to surface ships, combat aircraft, and ballistic missile submarines.

10. Satellite communications system

In October 1958, a development program was initiated for a prototype of an operational delayed repeater satellite communication relay system. This work is a further refinement of the work initiated under Project Score (item 7, above). The purpose of the communications satellite is to provide vitally needed intercontinental trunking capacity. Existing capability is likely to be saturated within the decade. The three phases of the communications satellite program will proprovide (1) intercontinental point-to-point communications through a satellite repeater, (2) two-way communications through a satellite repeater, and (3) broadcast-type communications to ground and mobile units. The initial launches in this program will concern the delayed repeater system wherein the satellite acts as a message courier. Later versions will be known as the 24-hour (or lower) orbit repeater capable of receiving and retransmitting messages on an instantaneous basis in 22,000-mile orbits.

11. Worldwide ground-based surveillance system

In order to assure a well integrated system of facilities, equipment, operating frequencies, communications nets, etc. required for an effective worldwide ground-based surveillance system, a decision was made in October 1958 to undertake a comprehensive study of the subject. The Jet Propulsion Laboratory, California Institute of Technology, was engaged to perform this study. In early January 1959, an agreement between NASA and the Department of Defense was reached on joint implementation and use of worldwide space tracking, data acquisition, and communications networks. Tracking facilities of each of these agencies, whether planned or in being, will be used by the other agency until the load increases to a point where this arrangement is no longer practical. A joint technical committee will monitor this program for the two agencies. As part of this total program a decision was made in January 1959 to provide one primary read-out data installation in Spain and one secondary (transportable) read-out installation in Japan. The Spain installation is to be an 85-foot antenna with sidereal mounts.

12. Missile defense alarm satellite (Midas)

In November 1958, ARPA directed ARDC to proceed with the independent development of a defense alarm satellite using infrared techniques. This program is designed to fulfill an urgent requirement for very early warning capability.

13. DISCOVERER project

In December 1958, the decision was made to develop a basic military research satellite program designated the DISCOVERER project. The primary objective of this project is to further the development of new systems and techniques for use in the production and operation of all military space vehicles. This will involve vehicle guidance for different orbital conditions, payload stabilization and recovery techniques. The initial objective is to test components and subsystems. The first launch was successfully accomplished in February, however, orbit life was a relatively short period. Later satellites in this series will carry biomedical experiments involving recovery of live animals. These will provide valuable data for the joint NASA ARPA man-in-space program.

14. Spacetrack

ARPA issued an order in December 1958 to ARDC to develop the Spacetrack program consisting of the necessary studies and experiments leading to recommendations on functions to be performed by a national filter center (as a part of item 11, above) and to operate an interim National Space Surveillance Control Center. (NSSCC). The major responsibility of a national filter center is the cataloguing of all earth satellites and space vehicles and providing information to appropriate agencies.

15. Exploratory research

To provide backup for its programs of vehicle and payload development, ARPA maintains a program for basic and exploratory research involving numerous subjects and contracts. This program is encouraged to consider any new concept which would advance the state of the art or potential of space technology.

16. Real-time repeater communications satellite

Work was initiated in January 1959 on the preliminary design, supporting research and development on the real-time repeater communications satellite. It is expected that by 1962 this program will result in a 24-hour communications satellite capable of receiving and retransmitting messages to any point on the globe on a real-time basis. Such a system should provide the answer to overloading conditions and other deficiencies in our present communications network.

II. BALLISTIC MISSILE DEFENSE

Major program decisions in the field of ballistic missile defense during this period have been grouped into four categories, as follows: (1) missile flight phenomena, (2) missile and satellite identification and kill, (3) missile acquisition, tracking and data reduction, and (4) feasibility investigations and exploratory research.

1. Missile flight phenomena

(*a*) A program to develop and operate an optical missile test range measurement program was initiated in October 1958. This program will provide for the modification of a KC–135 aircraft; the outfitting of a high altitude aircraft with a

stabilized platform; modification, equipping and operation of the motor vessel *Acania;* and modification of the ROTI tracking system for obtaining rocket plume measurements and for infrared scanning. The purpose of this program is to obtain information on behavior of bodies in the atmosphere including reentry phenomena. Currently, a contractor is being selected to coordinate the missile test range measurements program.

(*b*) A vertical probe program was initiated at the Eglin gulf test range in February 1959 for the purpose of upper atmospheric experimentation and reentry studies. This program envisions approximately 20 firings in calendar year 1959.

(*c*) In June 1958, a study was initiated on the effect of space weapons on military electronics systems.

(*d*) In August 1958, the Lincoln Laboratory of MIT was asked to undertake the research program relating to reentry physics. A major portion of this program is to take place at the NASA Wallops Island range and the Atlantic missile range. As part of this same request, the Lincoln Laboratory was asked to undertake a design study of instrumentation radar for use in a down range test program.

(*e*) A program on atmospheric interactions with missiles in the launch and mid-course phases and on weapon ionization phenomena was initiated in November 1958. This program will involve the launching of NIKE-CAJUN and AEROBEE-HI rockets for study purposes.

(*f*) Projects were initiated in November 1958 concerning laboratory work on the physics of reentry. Specifically, the work involves (*a*) shock tube measurements for evaluating IR and RF radiation from high velocity shock regions, (*b*) ionization of airflow around model reentry bodies, (*c*) heat transfer, and (*d*) flow transition at high mach numbers.

(*g*) Contract arrangements were completed with a contractor in December 1958 to design, fabricate and install one instrumentation tracking radar to be used on the down range program as an AICBM data gathering and research tool. Various radar and discrimination techniques will be tested.

2. Missile and satellite identification and kill

(*a*) In June 1958, an ARPA order was issued requesting ARDC to enter into two contracts for study of weapons systems to combat hostile satellites.

(*b*) In December 1958, several contracts were entered into for studies and experiments in decoy discrimination utilizing nuclear effects.

(*c*) Contracts were let in January 1959 for "AICBM system studies." This work involves research in the field of systems discrimination to determine the distinction between warhead and chaff or decoys.

3. Missile acquisition, tracking and data reduction

(*a*) In September 1958, ARPA completed arrangements with ARDC for continuation of the development of an electronically steerable array radar. It is expected that this program will result in considerable improvement in radar techniques.

(*b*) Investigation and experimentation leading to the development of a two-dimensional filtering technique applicable to ORDIR [1] was initiated in September 1958. The objective of this program is to advance signal processing art by synthezing devices which can rapidly measure position and velocity simultaneously. At this time, analytical and experimental investigations were also initiated leading toward improvement in basic ultrasonic delay line technology.

(*c*) In December 1958, the decision was made to fully support a high power microwave radar research program. This involves investigation of high power radar components and techniques to evolve experimentally basic design information leading toward microwave radars with capabilities compatible with requirements imposed by targets of the future. This program includes the procurement and installation of a 60-foot equatorially mounted steerable paraboloid antenna and an improved transmitter.

(*d*) In January and February 1959, additional contracts were entered into for exploratory research on advanced radar techniques leading to new and unusual concepts for advancing the radar art. In March 1959, a program was initiated whereby a contractor would be selected to design, build, install and operate a microwave radar employing multibeam "pincushion" principles suitable for investigating advanced techniques for ballistic missiles, tracking and decoy discrimination.

[1] Omni-Range Digital Radar.

4. Feasibility investigations and exploratory research

(*a*) Theoretical studies and investigations of the behavior in various kinds of ballistic missile defense systems were undertaken in November 1958. These studies are concerned with prediction of the behavior, effectiveness, cost of alternate defense complexes, intercept systems, and the physical interactions which may occur in such systems because of large-scale effects produced during operation.

(*b*) In March 1959, a research program was initiated to produce experimental and theoretical information for utilization in the design of a hypersonic interceptor subsystem. This system would be used for intercepting enemy ballistic nose cones at long range outside the atmosphere. Also, in March of this year, plans were completed for entering into contracts on six projects in the field of data processing for decisions and decoy discrimination.

III. SOLID PROPELLENT CHEMISTRY

The objective of this program is to conduct research leading to new ingredients for fuels, oxidizers, and binders with considerable gain in specific impulse. To accomplish this, projects which have been and are being initiated are grouped into four categories. Research in each of these areas is largely competitive in nature. Work planned and work underway in these areas is as follows:

1. Integrated programs

The term "integrated contract" signifies that the contractor considers the following areas: (*a*) thermochemistry, (*b*) thermodynamics and performance calculations, (*c*) synthesis of new fuels, oxidizers, and binders, (*d*) propellent formulation and compounding, and (*e*) the study of properties of the final propellent including ballistic and mechanical properties.

2. Specialized programs

This type of program will enable the Department of Defense to obtain the services of laboratories especially highly qualified in certain branches of synthetic chemistry pertinent to the problem at hand. The principal areas covered in the specialized contracts include new oxidizers utilizing oxygen fluorine bonds, interhalides and transition metal complexes, new light metal fuels such as beryllium and polymeric aluminum hydrides, and research directed toward new fluorination techniques.

3. Basic programs

Studies in these areas include research on detonations, basic and exploratory work concerned with the properties of refractories, burning mechanism studies, exploratory studies of novel methods of energy storage, and the properties of fiber-reinforced alloy compacts.

4. In-house programs

Much of the required research in solid propellent areas will be accomplished in facilities of the three services. In addition, initial work on use of new ingredients must be confined to certain laboratories which are free of proprietary restrictions. Designated laboratories are: Ordnance Missile Laboratory, Naval Test Station, Picatinny Arsenal, Naval Propellant Plant, Jet Propulsion Laboratory, and the Rohm & Haas Redstone Division.

BASIC RESEARCH PROGRAM

Mr. MAHON. Mr. Quarles, what is your thinking with regard to the amount of effort we are putting into basic research? You are probably familiar with the so-called tithe for science which would set aside 10 percent of the value of each research contract for basic scientific research programs. Do you agree with the concept that we should be putting much more money into basic scientific research?

Mr. QUARLES. Mr. Chairman, I agree with that as a broad concept, but I do not agree to the specific application of it to defense nor to the specific provisions, as I understand them, of the bill that you speak of. I would like to explain how one could agree to the broad concept and not be in full agreement with this application of it.

Basic research is something which of course goes on all over the country and under auspices many of which are completely unrelated to the Defense Department. It deals with the advancement of science and technology.

It would be improper, in my view, for defense projects to assume that they must pay a 10 percent tithe for research, although it is also true that we have in recent years greatly increased the basic research component of our total research and development program, and our budget this year somewhat more than maintains the big step-up in that program which we inaugurated last year. But there are many other agencies in the Government and many agencies outside of the Government who also are sponsoring basic research. I think one should take that whole picture into account in considering laws of this kind.

Mr. MAHON. Would it simplify our problems of keeping track of defense research efforts if we were to divorce all basic research from the defense program entirely and put it under the National Science Foundation or other agency of the Government?

Mr. QUARLES. I think it would not, Mr. Chairman. I think that would be an unwise move. We have considered that very carefully with the National Science Foundation and with the scientific community, the National Academy of Sciences and people of that kind. I think we are unanimous in the view that it is wise for the Defense Department to be responsible for some basic research.

In the first place, there are areas that are peculiarly related to defense that we should be sure are supported basically; and in the second place, it is very wholesome for Defense people to be in touch with basic research. They are naturally thrown into touch with basic research people when they have to administer these programs.

So, just trying to give a very abbreviated answer to the question, I think the present arrangement is sound and that it would be very unwise to make such a change.

MITRE CORP. PROGRAM

Mr. MAHON. I have here an advertisement which appeared in one of our local papers about 2 weeks ago. The advertisement is by the Mitre Corp., and it extends an invitation to—

behavioral scientists interested in joining an expanding scientific community.

In fine print it says:

Human factor scientists are afforded a unique opportunity to join the technical adviser to the air defense system in the integration division of the U.S. Air Force. This nonprofit organization has been created by the USAF to provide the required scientific and engineering services for the integration of the air defense system.

Obviously, the Mitre Corp. is working under some sort of research and development contract with the Government. What is the relationship between behavioral scientists and the integration of air defense systems?

Mr. QUARLES. Mr. Chairman, the Mitre Corp. was a creation of a certain group of people, with the Massachusetts Institute of Technology playing the leading role in it, but other people who had patriotic interests and not motivated by profit joined in the incorporation of Mitre. The Mitre contract is, as stated, now with the Air Force,

although consideration is being given to broadening it and placing the contract on the Defense level rather than Air Force level.

It carries forward systems engineering types of studies in relation to air defense, and primarily continental air defense, somewhat as an outgrowth of the Lincoln Laboratory work with which I am sure the committee is familiar.

The behavioral science side of the thing is a relatively minor part of it, but recognizes the fact that in setting up a system of this kind, one must consider human factors and human problems in staying before radarscopes, for example, and taking off data, or other kinds of human factors that enter into the whole system. This was an attempt to interest enough people in the behavioral sciences to come in to Mitre to build up a relatively small force of such specialists.

I could add to this, but perhaps that is enough to answer the question.

Mr. MAHON. A thing which concerns us in the area of research and development is that with more and more money going into this area, we have a tendency, it appears at times, to support almost anything that anyone can come up with. In your review of service research programs do you find many projects which are of questionable nature, that is, projects which have no reasonable bearing on defense problems? It may be that this behavioral study is really not valid, but is just somebody's dream as a means to spend more money.

Mr. QUARLES. I think that advertisement gets the behavioral aspect of this thing clear out of context, Mr. Chairman. The Mitre Corp. operation of systems engineering in air defense is, I am satisfied, a very important thing. Our air defense system, with its semiautomatic ground environment, with its automatic weapons systems, ground-to-air systems, with its supersonic interceptors, and all the rest, is a tremendously complex technical organization, and the Mitre Corp. was organized and technical experts in this area were drafted into the corporation to provide continuity in the handling of these technical problems. I am sure that is wise, and I am sure there is a big payoff by doing so.

The human engineering aspect of the thing is a minor part of it, and this advertisement simply reflects the fact that the Mitre Corp. had not found it possible to recruit quite the kind of specialists in this area that they felt they needed. They are not going into any new, fancy behavioral studies. This is merely to have that aspect of the air defense systems work properly staffed.

Mr. MAHON. Mr. Sheppard.

Mr. SHEPPARD. These people have a contract, I understand, with the Air Force.

Mr. QUARLES. The Mitre Corp. does have; yes.

Mr. SHEPPARD. In which they are being paid for services rendered.

Mr. QUARLES. That is correct. The great bulk of the services is in the field of electronics and other technologies immediately related to the establishment and integration of the Continental Air Defense System.

Mr. SHEPPARD. We are not to construe from your previous statement about the type of people who got together with a nonprofit concept, that they are operating this contract under a degree of benevolence, are we?

Mr. QUARLES. I think benevolence would not be quite the right word, Mr. Sheppard, but it is nonprofit. The organization was

created to accomplish a purpose which the Air Force defined to these people as very necessary to be accomplished.

Mr. SHEPPARD. What, in your opinion, is the difference between the type of scientific information they are providing under their contractual procedures which would not possibly fall in the same field as that being provided by the Ramo-Wooldridge Corp? Where would be the line of demarcation of interest in the presentation and review or evaluation by the respective groups?

Mr. QUARLES. The Ramo-Wooldridge Corp., Mr. Sheppard, deals almost entirely with the ballistic missile program, strategic weapons. The Mitre Corp. is dealing with systems engineering in the air defense field, primarily in the electronics systems of semiautomatic ground environment, communications, weapons control, early warning and identification of targets, and that kind of thing.

Mr. SHEPPARD. Do they review and evaluate or do they propose? Which of the two approaches do they have under this contractual procedure?

Mr. QUARLES. They do review and evaluate the new electronic systems and the method by which they will be fitted into this whole air defense plan, and they do recommend the method of integration, the timing of integration, and at times they might recommend the specifications applying to components so as to make them fit into the whole. But of course, they are advisory in the final analysis, and not decisive in this area.

Mr. SHEPPARD. To what degree do they contribute to the determinations which are made by you gentlemen who are charged with the responsibility for these missions?

Mr. QUARLES. They would contribute to the ability of Dr. York, for example, to make decisions in the air defense area, and that, in fact, is just the reason we are considering bringing this contract and this operation under his office rather than leaving it in the Air Force, simply because it involves technology which is broader than Air Force. To some degree it involves Army and to a lesser degree Navy systems as well as Air Force systems.

Mr. SHEPPARD. I would assume, without being able literally to evaluate an issue of this character, contractors functioning in this field as delineated in this advertisement and as interpreted through hearings on the Ramo-Wooldridge people, that you people who are called upon to make these decisions and assignments would be in a much better position to have them under your jurisdiction than to have them scattered, as it were, in the different military branches, not that I am particularly ambitious to see you acquire more operational facilities than you presently have. I think you have about reached your maximum, personally, but that is not the point. The point is, if we are to have a contribution to the total conclusion, where should this operation be centered to result in the greatest effectiveness.

Mr. QUARLES. Our point of view about that, Mr. Sheppard, is that we will leave in the services all of those functions which can be cleanly assigned to services. However, those which cut across service boundaries to such a degree as the Mitre Corp. in continental air defense may very possibly be better operated at the Defense level.

Mr. SHEPPARD. I wonder how many contracts we have scattered throughout the military branches, if you know, Mr. Secretary, having

to do with relationships of parallel character to that which we have just been discussing.

Mr. QUARLES. I could not answer that offhand. There has been some showing on that score, Mr. Sheppard, when we appeared before the House Committee on Government Operations, and I believe that that information would be responsive to your question. May we file it?

Mr. SHEPPARD. Yes. I would be very happy to have it, so we can see what the determinations have been or perhaps will be.

(The information requested follows:)

The following contracts bear a similarity to the Mitre contract although there are significant differences among them in scope and in degree to which they cut across service boundaries:

1. Office of Secretary of Defense:
   (*a*) Institute for Defense Analyses—Weapons Systems Evaluation Group.
   (*b*) Institute for Defense Analyses—Advanced Research Projects Division.
2. Department of the Army:
   (*a*) Operations Research Office—Johns Hopkins University.
   (*b*) Combat Operations Research Group—Technical Operations, Inc.
3. Department of the Navy:
   (*a*) Operations Evaluation Group—MIT.
   (*b*) Naval Warfare Analysis Group—MIT.
4. Department of the Air Force:
   (*a*) The Rand Corp.
   (*b*) Analytic Services, Inc.

OPERATIONAL ASSIGNMENT OF POLARIS MISSILE

Mr. SHEPPARD. Several of my colleagues on the floor of the House during the past 10 days have presented a question which you may want to answer, on or off the record, I do not know. What is the contemplated change of missions previously assigned in the diversion of the POLARIS operations from the Navy to the Air Force? What do you contemplate doing with that problem?

Mr. QUARLES. The question of the assignment of the POLARIS missile operationally is now before the Joint Chiefs of Staff for their recommendation. I would make it clear, however, that we are dealing here not with the development nor the procurement nor the deployment of that missile. That will always be a Navy function. But just as certain Navy forces may be assigned to one of the unified or specified commands, so it is conceivable that the POLARIS missile submarines should be assigned operationally to one of the unified or specified commands such as the Strategic Air Command.

Mr. SHEPPARD. Let me put it this way so we will have no misinterpretation, because this will be a very touchy situation. To be perfectly frank with you, this is another, may I say, psychological Marine Corps transfer situation which is liable to explode on the floor of the House. It is definitely understood by all of those who have been associated with military functions and who know anything about them that component parts of any service are subject to joint command levels under certain conditions. That has to do with what I call and interpret as being a regular military functional concept. So I am not addressing myself to that particular question, because that is an established factor.

I can readily appreciate and others I am sure can appreciate the fact that potentially a situation may develop in which SAC may be under the command of a naval officer in certain geographical areas under

certain military conditions. It could happen. That is what we are discussing as far as the command level is concerned.

But to get back to the basic operational function, which is the point I was trying to make, and that exclusively, nothing is contemplated and, so far as you know or are concerned at the moment or in the future, wherein the actual operation of the POLARIS functions, militarily speaking, is to be divested from the Navy and transferred to the Air Force. That is what I want answered, eliminating the command level that you referred to.

Mr. QUARLES. Mr. Sheppard, the submarine-launched POLARIS missile is a clean Navy function through research and development, procurement, deployment, and operation, and I know of no thought that that be changed. The only question is the operational command question, and even there I would like to make it clear that it is before the Joint Chiefs of Staff without prejudice as to how they might recommend the command function be handled.

Mr. SHEPPARD. That answers that question.

TRANSFER OF FUNDS

What has been your problem under the transferability that you referred to in response to the chairman, as far as handling your funds is concerned? Have you encountered any difficulties? Have you had any retardation in handling your breakthroughs in the program as it has existed in the past?

Mr. QUARLES. We have had difficulties which would have been very real and I think would have had the effect of impairing the program had we not had the ability given us by the emergency fund and the transfer authority to support programs that arise during the year and were not adequately foreseen and funded at the beginning of the year when the budget was prepared.

Mr. SHEPPARD. I can readily appreciate the requirement for elasticity as far as funds are concerned, because it is rather obvious to anyone who has been around here very long that you are dealing a considerable portion of the time with unknown factors, in their origin at least.

Mr. QUARLES. Exactly.

Mr. SHEPPARD. It is very difficult to have a firm concept of expenditure requirements when you are dealing with an issue of that character. That is a feature of all scientific investigation and development, whether it be governmental or private. There should be a certain amount of elasticity there.

Your statement is that you do not feel you have suffered any reverses and that the funds available in that field at least in the past have been taken care of.

Mr. QUARLES. Substantially so, yes, sir. I think the $150 million emergency fund and the additional $150 million transfer authority will continue to give us the needed flexibility.

Mr. SHEPPARD. Where would you contemplate transferring the funds from under the requested transfer authority?

Mr. QUARLES. If the law permitted us full latitude, as it has, I believe, in the past, we would expect to transfer it from any available funds in any of the services. It would all be a matter of Army, Navy, or Air Force appropriations. Generally speaking, we would expect

that if the Army needed it for a new purpose, an emergency purpose, the transfer would be from other Army accounts, although we would not like to have that as a limitation.

REPROGRAMING OF FUNDS

Mr. SHEPPARD. How much reluctance would you have to follow the same process utilized previously by the services and this committee whereby they come up with as nearly a firm program as they can, and on a line item basis justify their requirements to the best degree that they can, and then if later on during the year something occurs which transcends the original presentation, evaluation, concepts, and so forth, they operate, I understand from them quite successfully, under the reprograming operation.

Mr. QUARLES. They do, Mr. Chairman.

Mr. SHEPPARD. How much reluctance would you have to participate in a reprograming operation wherein the Congress could be kept in step with you? Because delays are not necessary in the reprograming at all. In fact, it is quite the reverse.

Mr. QUARLES. Mr. Sheppard, we are dealing with something over and above reprograming here, if I might explain.

Mr. SHEPPARD. All right.

Mr. QUARLES. The services have this reprograming latitude within your line item appropriations to them. In other words, by due notice to your committee and all, they can transfer from one program to another within an appropriation.

Mr. SHEPPARD. Pardon me, not by giving notice. By getting permission.

Mr. QUARLES. I stand corrected. I am dealing here in the transfer authority matter with something over and above that. I am dealing with the problem of transferring from one appropriation to another, which is not now admissible on the reprograming basis, even by permission. It is this additional latitude beyond the reprograming latitude that I am advocating to the extent of $150 million authority vested in the Secretary of Defense and, of course, also to the extent of an emergency fund of $150 million which would be a direct appropriation subject to Secretary of Defense allocation to an emergency purpose as it arises.

Mr. FLOOD. Will the gentleman yield there.

(Off the record.)

Mr. FLOOD. What about that paragraph, Dr. York?

Dr. YORK. To what do you refer?

Mr. FLOOD. I get the impression you have been delegated by the Secretary of Defense that if Congress appropriates funds for some specific items or articles and later on in the summer, as you say, when it gets a little warmer and Congress is not here, if you don't like it or disapprove, in your words, you will change it. You used the words:

> We will be in the position to quickly approve, disapprove, or modify programs in accordance with the authority delegated to me by the Secretary of Defense.

That makes you quite a weapon in your own right.

Dr. YORK. This is the authority he is allowed to delegate to me by last year's Reorganization Act.

Mr. FLOOD. I know, but Mr. Quarles assured us that that Reorganization Act did not give him any greater or lesser rights than he had before, in the first paragraph of his statement.

I think, Mr. Sheppard, this is what you are talking about.

Mr. SHEPPARD. That is correct.

(Off the record.)

Mr. QUARLES. May I pick up, Mr. Flood. Would you be willing for me to comment, Mr. Flood?

Mr. FLOOD. Surely.

Mr. QUARLES. We are dealing with three different levels of reprograming here.

The military departments have latitude in the appropriation as it stands. Every one of their thousands of projects are not here as line items. They are lumped. Dr. York's references are to individual projects within these line items and to the preference of one above another or the elimination of one or the increase of another. That is authority which the Congress leaves with the Secretary of Defense and which the Secretary of Defense exercises through the mechanism Dr. York has described. It does not require reference back to the committee, because it is not reprograming in the committee's sense.

Then you have changes in the program presented to the Congress in which the departments decide as they go along that they would like to emphasize one program more than another as presented to the Congress. That kind of reprograming within an appropriation can be accomplished by the Department's coming to this committee and getting approval of the reprograming.

Then there is the third level, in which I am dealing with the transfer of funds from one appropriation to another. At this level we are asking the Congress to give the Secretary of Defense a maximum of $150 million of transfer between appropriations.

Mr. FLOOD. Mr. Chairman, have you listened to this ex cathedra interpretation of what Congress did? You have just heard, Mr. Chairman, a very clear, a very precise delineation, as only Mr. Quarles can give it, of what you voted for or what you thought you did.

Mr. SHEPPARD. May I interrupt the gentleman at this point and suggest that when Mr. McElroy appeared before this committee that subject was brought up relative to the transferability, and his statement was—I quote:

> We are not asking for any extension of transferability. We are not interpreting this authority as such.

That is the reason I approached the subject.

Mr. FLOOD. I raised the question because I thought Dr. Quarles was leaving immediately, and I did not know who I was going to talk to later. I am very much concerned that this committee, with this very high level talent that we have here, come to some kind of understanding on this record as to what jurisdiction the Secretary of Defense has or does not have, in their mind and our mind, because these are the four men—and primarily I emphasize Dr. Quarles is the one—who are going to advise the Secretary of Defense as to what power he has or hasn't. It will be up to the Under Secretary to execute this power rather than the Secretary, really. He will be stuck with it.

He has just told us in four brilliant paragraphs what he thinks that bill did. We had better be sure that we know what he thinks and examine him on it, and be sure that Dr. York understands what Dr. Quarles just said Dr. York is to do, and be sure that the Department of Defense bill under this new program format as Mr. McNeil gave it to us is in agreement with all parties concerned, in fairness to these four men.

Then we have no right, after today, to come back to them next year and say, "You should not have done this because you had no right." They will point to this record made as of noon today and say, "Mr. Flood and Mr. Sheppard asked us about that. Mr. Flood raised a flag of warning and quarantine, and we disposed of it concisely. The blood be upon your own head."

This is a very important examination.

Mr. SIKES. Mr. Chairman, this is an important matter I would like to suggest that the language in Dr. York's statement is very broad language which could include a great deal of authority. Since it is now time to recess for lunch, I think it might be well for these gentlemen to be prepared to discuss this matter more specifically this afternoon.

Mr. FLOOD. They may be surprised what we think. They may be in an ivory tower of their own down there, blissfully unconscious of what Congress meant at all, with all deference to their honesty and sincerity of opinion. We may be at diametric opposites. We may be in complete agreement. But this is the time and these are the characters in this scene, and we must dispose of an extremely important problem.

Mr. MAHON. I do not think we should call our distinguished guests "characters."

Mr. FLOOD. "Dramatis personae," then.

Mr. MAHON. I believe you have indicated they are really the Four Horsemen of Space insofar as the military is concerned.

Mr. FLOOD. But not the Apocalypse.

Dr. YORK. Not just space, sir.

Mr. FLOOD. That is my point. Not just space.

Mr. MAHON. I believe by unanimous agreement we were to meet at 1 o'clock today in order to facilitate the hearing.

(Off the record.)

Mr. MAHON. Let us make it at 2 o'clock. We will be back at 2 o'clock, and we might run beyond 4.

TUESDAY, APRIL 14, 1959.

AFTERNOON SESSION

REVIEW OF RESEARCH PROGRAM FUNDING AFTER CONGRESSIONAL ACTION

Mr. SIKES. Mr. Chairman, when we adjourned the committee for lunch we were discussing a very important matter; the transfer authority which is to be exercised by the group now before us.

The discussion was brought on, at least in part, by a comment Dr. York made in his prepared statement which I shall quote.

My Office has been and will continue to be engaged in a searching review of the proposed fiscal year 1960 RDT & E program so that by the time, later on this summer, when the military departments and the Advanced Research Projects Agency support their apportionment requests and the supporting program data we will be in the position to quickly approve, disapprove, or modify programs and projects in accordance with the authority delegated to me by the Secretary of Defense.

Now, the language in question is this:

We will be in the position to quickly approve, disapprove, or modify programs and projects in accordance with the authority delegated to me by the Secretary of Defense.

We discussed this before lunch, and it was commented on by Mr. Flood and by Mr. Riley who has had to leave the room in order to meet with the Governor of his State, but I would like to know how you gentlemen who are before us interpret this role and just what you read into the meaning of this paragraph.

May I ask each of you to answer that?

Mr. QUARLES. Perhaps, Mr. Sikes, it would be well if I lead off.

Mr. SIKES. Very well.

Mr. QUARLES. First, I would like to make it clear that we are talking about operating within the appropriations of the Congress and the language of the appropriations and the mechanisms for working with this committee that have been developed by the military departments and the Department of Defense in respect to appropriation accounts. So I did not mean in any way to change either the intent of the appropriations or the mechanism that has been developed for working with the Congress and this committee.

Now, within the authorizations and latitudes given to us by the Congress in this matter we have certain administrative procedures. Within the Department of Defense under the new setup, one administrative procedure will be for the Director of Defense Research and Engineering to review the programs of the departments. As a matter of fact, they will be reviewed at the time they are formulated for the budget, but more specifically and in more detail they will be reviewed at the time they are proposed for funding for apportionment release.

That review process does involve, in accordance with the law, the reorganization act, and in the language that Dr. York read, his review in his research and development and engineering program.

Mr. FLOOD. Do not lose your chain of thought. We have not reached the Bureau of the Budget problem yet. We are still down with you.

Mr. QUARLES. I will touch on how we interpret the Bureau of the Budget end of this thing.

Mr. SIKES. Let us have his complete answer. Will you proceed.

Mr. QUARLES. I was saying within the latitude given by the Congress, we will administratively use certain procedures and judgments in deciding how the program will be carried out. If these decisions involve changes that go beyond the scope of the latitude given in the appropriation act, then we understand we will do either of two things; that we will come to the Congress in the reprograming procedure to get that straightened out, as we have done in the past, or we will use, if necessary, some of the transfer authority given to the Secretary of Defense by the Congress, if it is given again, to effect a transfer between appropriations.

Now, as to the Bureau of the Budget, when I spoke of the process that will start, let us say, next summer after the 1960 appropriation is made, the departments will formulate plans and will come in in the research and engineering area to the Director of Defense Research and Engineering for approval of their plans.

Let us assume for the moment that they are approved as presented. Then that approval will carry through our Controller's Office, and the departments will proceed through those Controller fiscal channels to get the release of the funds in accordance with this program. The Comptroller in forwarding the request to the Bureau of the Budget will, of course, be informed of the approval of the Director of Defense Research and Engineering.

In my statement in answer to Mr. Flood's question this morning, I did not think that I was opening up any new ground, either of procedure or of interpretation of the appropriation act and our procedures in relation to the Congress except to explain how the new organization fits into this pattern.

Mr. SIKES. Mr. Secretary, in what way, if any, does the procedure that you have just outlined differ from the procedures that have been followed heretofore?

Mr. QUARLES. I think only in this respect—that under the new organization there is delegated to the Director of Defense Research and Engineering more positive control in the research and engineering programs of the Department than has been previously exercised. That means a difference in that sense, but this is really a difference of degree and not a difference of kind, because the Assistant Secretary for Defense Research and Engineering has always exercised a certain amount of guidance over the program.

Mr. SIKES. Is that a difference between the activities of the Department of Defense, or a difference in the procedure between Congress and the Department of Defense?

Dr. YORK. This is an intradepartmental thing. These are the thoughts that the Secretary has always had, but he has delegated them to me in a somewhat stronger form than they were previously delegated to the Assistant Secretary of Defense for Defense Research and Engineering.

Mr. SIKES. So far as the relation of Congress and the agencies, or the Department of Defense specifically is concerned, no change is contemplated from the system you have previously followed; is that correct?

Mr. QUARLES. I think that that is precisely correct. You will, of course, recognize, Mr. Sikes, that the Congress has not always given the Secretary of Defense this transfer authority, or has given it to him in varying amounts, but to the extent he has had it before it has been used the way we propose to use it at this time.

Mr. SIKES. May I ask the other gentlemen who are with you, Dr. York, Mr. Holaday and Mr. Johnson, if they are in agreement with the statement that you have given?

Dr. YORK. That is how I understand it, sir; yes. This paragraph refers more to my relationships with the services; in fact, entirely with my relationships with the services rather than my relationship with superior echelon.

Mr. FLOOD. Let the record show that Mr. Holaday and Mr. Johnson concur, if they will so state to you that they do.

Mr. HOLADAY. Yes.
Mr. JOHNSON. I do.
Mr. SIKES. Thank you, Mr. Flood.

DEVELOPMENT OF LIGHT WEAPONS FOR USE OF TROOPS

Mr. Secretary, I do not know how much in detail we should attempt to go, and I will paint with a broad brush.

Mr. Riley and I were discussing a little while ago the great importance of developing a larger family of light weapons which would be available for the use of the troops and which would permit our smaller Army to acquit itself most effectively. We are thinking primarily of the lightweight weapons of the conventional type which utilize small but powerful explosive warheads. Some of that has been discussed in the David Crockett family. A few days ago I had called to my attention the possibility of developing a new lightweight rifle using a very small round of ammunition, something even smaller than a .22 caliber bullet. It is fired with extremely high velocity. The rifle would be able to fire many, many rounds without reloading and still would be lighter than the conventional rifle. It would be more effective in combat than the conventional rifle because of the lethality of its round of ammunition.

To what extent is the Department which you represent stressing that type of development? Will anyone present answer that question?

Mr. QUARLES. Again let me just say a word about it. To deal first with the tactical atomic weapons area, such as the David Crockett type of weapon—I assume we are in executive session at this time?

Mr. SIKES. Yes.

Mr. QUARLES. Off the record.

(Discussion off the record.)

Mr. QUARLES. In respect to the rifle, just to pick another example, and in quite a different area, as you know, we agreed with the Army last year that we would proceed with production and deployment of the new rifle series, the small-arms series, and this is underway in quantity production. At that time there were a number of projects in the more advanced areas, more advanced design area, including the small caliber, very high velocity designs. These were thought by the Army not to be ready for adoption at that time, but they are being pursued for research and evaluation. A program of that kind in Army ordnance originated, generally speaking—in fact, almost always—with the Army, or with their advisers and through the Army. That kind of program would come to Defense, generally speaking, as an Army recommendation.

Mr. SIKES. I believe that Dr. York has a comment to make.

Dr. YORK. Yes. I welcome an opportunity to answer that question because it is something that concerns me very much. I have become rather concerned with the fact that to some extent when I talk with the press and others, even the Congress, there is very great attention focused on the glamorous projects, meaning by that space or missiles, and really not enough on some of these other items.

I am personally most interested in the thing that you mentioned, and some of the people that I have I find are, and some of the people that I am getting are. There are a great many things that fall in this

category, so many that it is difficult to develop very quickly a good grasp of them and we take them one by one.

In connection with small arms, where that includes both rifles, pistols, and so forth, I am aware of these projects you mentioned. We are finding out all we can about them so we can support the Army to the fullest extent it feels it needs support, or even more than they feel they need support.

We are looking at new methods for transportation, ground transportation, sea transportation, air transportation, methods of assault for the Army and the Marines.

The communications problem, both local and worldwide, is something we are focusing attention on; methods for getting local intelligence as well as worldwide intelligence, battlefield reconnaissance, and things of that sort.

We are looking at the small A-bombs, the David Crockett series. Also, we are looking at small missiles for delivering slightly larger versions of A-bombs.

(Discussion off the record.)

Dr. YORK. It is a field that I am getting more interested in and I am anxious to see that it gets its proper share of support.

Mr. SIKES. I know that you have been exploring these fields, and I have been heartened by the interest you express.

(Discussion off the record.)

Mr. MAHON. Mr. Norrell.

Mr. NORRELL. I have no questions.

NUMBER OF MISSILES UNDER DEVELOPMENT

Mr. ANDREWS. Mr. Holaday, you stated that we have about 41 missiles now either under development, research, or procurement—21 are being produced and the other 20 are under research and development. Do you think that we will continue to work on that many, or will we taper off and settle maybe on one IRBM and one ICBM?

Mr. HOLADAY. Well, I think you have to answer your questions. There will be a reduction without any doubt, but there are always new ones coming on. Over the past 3 years the level has stayed just about constant. I am not saying that this guarantees that the number will stay this large. I think over the long pull, if we are talking about 10 to 15 years from now, you will find this will reduce quite materially, to half this number, or less.

Mr. ANDREWS. Do you foresee the time when we will have enough ICBM's and IRBM's in our inventory and you will stop production of those types?

Mr. HOLADAY. Well, for instance on the JUPITER and THOR, we contemplate reducing and eliminating that production. The assembly lines will only go for a long enough time to make the necessary boosters required in the immediate space program. Then they will be eliminated. But as you go on in ICBM's, they may stay on the production line for quite some time due to new developments.

Mr. ANDREWS. Do you think in the field of missiles you will have the same experience that you have had with airplanes—having new models, or new missiles coming on?

Mr. HOLADAY. Yes.

Mr. ANDREWS. Every few years?

Mr. HOLADAY. Yes.

Mr. ANDREWS. Fifteen years from now the best ICBM that you have 5 years from now might be obsolete?

Mr. HOLADAY. That is right.

TOTAL R.D.T. & E. BUDGET REQUEST

Mr. ANDREWS. How much money, Mr. Secretary, is in the budget for research and development for all the services? Is that figure $5.6 billion?

Mr. QUARLES. The figure that you have mentioned includes funds that are in procurement accounts in support of research and development.

Mr. ANDREWS. That is about $1.8 billion and the rest is for research and development?

Mr. QUARLES. The rest is in title IV.

MINUTEMAN FUNDING

Mr. ANDREWS. Do you have any money in here for the production of the MINUTEMAN missile, or is all MINUTEMAN money research and development?

Mr. QUARLES. There is no provision in here for the production of the MINUTEMAN. I would have to look at the detailed figures to know whether the MINUTEMAN is supported in part by the procurement account. But if it is, it is supported there for research and development looking toward production rather than for actual production.

Mr. ANDREWS. Are you satisfied with the total amount in this bill for research and development and the procurement of experimental weapons?

Mr. QUARLES. I am; yes. I think that this bill is in good shape in research, development, test, and evaluation.

Mr. ANDREWS. Do you think that your MINUTEMAN program could be expedited by the appropriation of additional money?

Mr. QUARLES. We have put additional money into it by reprograming, as I believe you know.

Mr. ANDREWS. That is for 1959?

Mr. QUARLES. That is for 1959, and the provision in 1960 is still our best estimate of what will be wise to put into it in 1960. However, I have to say there we have the same reservation for 1960 that we had in 1959, that possibly it would seem wise as the year goes on to reprogram more money into it.

TRANSFER AUTHORITY

Mr. ANDREWS. Now, do you show here of your $3,772 million for research, development, test and evaluation, that you want $150 million in an emergency fund and in addition to that you want to have permission to use another $150 million. From what fund would that extra $150 million come?

Mr. QUARLES. We would like the Congress to give the Secretary of Defense latitude to transfer that $150 million from any other accounts in which the funds might be found to be available.

Mr. ANDREWS. Not necessarily this appropriation?

Mr. QUARLES. No. We would like it not to be limited to this appropriation.

Mr. ANDREWS. That is all, Mr. Chairman.

Mr. MAHON. Mr. Flood.

HARMONY IN ADMINISTRATION OF RESEARCH PROGRAMS

Mr. FLOOD. I am chiefly concerned with you, Mr. Secretary, since the chairman wants you to get away as fast as you can. I have some other questions for these other people.

Now, I would like to make this statement: I have been as concerned as everybody else has, by this confusion which apparently became acute when sputnik was born as to who was what and where. Of course, so was everybody else, and nobody as a fact knew.

But I am glad to see your Four Horsemen here today talking to each other and being very human about the whole thing. There was indication during the year that you would be murdering each other, but now we have Johnson and York and Quarles and Holaday showing every semblance of being amicable and being able to live and survive together. I do not even see anybody's tail feathers particularly ruffled, which is surprising and very encouraging. This, if nothing else, justifies this hearing today—to see you four show up in one piece and talk about the same things side by side, or shoulder to shoulder, whatever moth-eaten cliche fits this kind of business. That is much more important to me than anything all of you have said put together; if it is true.

Mr. QUARLES. I take it that is a question.

Mr. FLOOD. I do not want you to stand up and reaffirm "for God and country," or something, but if those are the facts, and if it is true, and if this is not a front or a show that you are putting on here for the cause, or to save the budget and to get this dough from this subcommittee, if your integrity is as apparent, or as clear as it appears to be, then we have a very happy situation in front of us and I hope that that is true.

Mr. QUARLES. I would not like to conceal our motive to get the dough from the subcommittee because that is perfectly true.

Mr. FLOOD. That is not immoral.

Mr. QUARLES. I will say for myself—and perhaps I can say it only for myself—I think you see the four of us sitting here exactly the way we work in the Pentagon. I am not conscious of there being tension or issues between us, and certainly there are no throat-cutting operations and that kind of thing that I am aware of. I think that we have well-defined fields to work in, and I think we all feel quite adequately and thoroughly challenged by the fields we do have and are quite satisfied to be given an opportunity to make progress in those fields. That is the way that I feel about it. You can get testimony from the others.

Mr. FLOOD. I have that impression. Now, again, this is not a high school literary society thing, this is no fraternity. I am not pledging you to something, but may I again be assured for the record that what Quarles has said is what I see? Johnson, will you buy this?

Mr. JOHNSON. Mr. Congressman——

Mr. FLOOD. Outside of money?

Mr. JOHNSON. This question has been asked——

Mr. FLOOD. I am not talking about money.

Mr. JOHNSON. I understand what you have been talking about. This question has been asked me by other committees. I am really astounded at the background for the question because I have not had one frustrated moment since I came to this job on February 12 of 1958. I said to the other committees I have gotten more done in the 14 months that I have been here than in any 14 months' period that I was engaged in business for over 30 years.

Mr. FLOOD. Do you know what a "rara avis" is? It is a rare bird in certain language.

Mr. JOHNSON. I think we are prone here in Washington to read the newspapers a little too avidly on the subject of controversy.

Mr. FLOOD. That is right.

Mr. JOHNSON. And there are groups of people who attempt to create the idea of controversy under any issues they can imagine.

I am just really astonished. There has not been the slightest bit of friction between this working group, and I am talking specifically between Dr. York, Mr. Holaday, and myself. I believe this extends to the three military departments.

Now and then we have a difference of opinion.

Mr. FLOOD. Do not go overboard. Relax. Reading from right to the left, what about you, Doctor?

Dr. YORK. I feel the same way as both Mr. Quarles and Mr. Johnson, namely, that the situation is as Mr. Quarles has described it, or as you described it and Mr. Quarles reaffirmed.

I must say that I have been somewhat surprised myself at the efforts of some people, apparently just to have fun or to make a good story, trying to conjure up important frictions and controversies.

Mr. FLOOD. How about you down here at the end, Mr. Holaday?

Mr. HOLADAY. Well——

Mr. FLOOD. I will be especially interested in your remarks because if anybody got the short end of the stick you did with the titles, the office, and all that nonsense. If you will buy this, where are we?

Mr. HOLADAY. I have no hesitancy at all about buying this. There are two points in connection with my comments here. One is that of course I have taken a very active part ever since I have been in the Department of Defense strengthening the Office of Defense Research and Engineering. As to the job of putting the centralized control in research and engineering I think this is very definitely something they have needed, and since I have been working for it for years I heartily support it.

Mr. FLOOD. Off the record.

(Discussion off the record.)

Mr. HOLADAY. The other point that all the rest commented on is the tendency on the part of the newspaper to feel that there is a big racket going on between the departments. This does not exist. Surely, we have differences of opinion, but when we get through the day's work we are all trying to do the same job. We try to get the final answers out that are best for the country. I just wish that we could get a little more feeling expressed by the newspapers that we are trying to work together because we are. We are not trying to fight each other.

Mr. FLOOD. I wish that you would tell Murray Snyder instead of his wasting three-quarters of his time with a lot of nonsense. When you make it stick this fast as you four have made it stick here today, even I believe that the truth is being told. If I believe that you are who else is going to quarrel about this around here?

Dr. YORK. It is just not news if we all agree.

Mr. FLOOD. This has all been magnified, as you people have complained, and properly complained. You know, your wife can tell you about the neighbor down the street in the block who comes in loaded at 3 o'clock in the morning and beats his kids and raises roofs. He is news, but she cannot tell you anything about the 200 other respectable fellows, good neighbors, who do not come home drunk at night and do not kick the family around. They are not news. You four appearing as the quartet for this object and purpose are really good, big news, and as of this afternoon Mr. Snyder, as usual, missed the point. Tell him that I pointed this out. Maybe he will buy it. This is a hot story if you can get it out some place.

Mr. FORD. Supposing we added a fifth member to this scene at the table with Dr. Glennan of NASA present. Would the same unanimity of thought and action be in existence?

Mr. QUARLES. As far as I am concerned, if he were here I would have expressed exactly the same views. He and I meet frequently to compare notes, not on the detailed planning of the program, because he and his organization deal with others in our place in the program, but as far as the organizational aspects between our departments are concerned, I believe that you would get the same testimony. Certainly you would get if from me in respect to NASA.

Mr. FLOOD. I know.

If he leaves that word "team" out, everything will be all right. Let us not tag these four fellows with that one. That has a connotation around here anymore, that does not belong to these four, or five, with Glennan, on board. They are too important to be used in connection with that word "team." This is something else, better than a team, whatever it is.

ELIMINATION OF PROGRAMS

Now, are you proceeding, Mr. Quarles, to look at these different projects? In your statement you say that you cut out six. You gave them to us—the RASCAL, the GOOSE, the WIZARD, the Navy Fighter, and so on, and I suppose NAVAHO is included. Are you still going after these cats and dogs? Here is a chance to see how good you are. Now, he says he has 41 of these pigeons flying around. Can you not cut down three or four when he is not looking?

Mr. QUARLES. I am not ready to say that we will not find some of those 41 that cannot be eliminated. I will say that there is not a one on this list that we have not already talked over very earnestly to make sure that it is justified in its promise and usefulness. That is the way that we will have to consider it and continue to operate. Unless we apply that kind of selectivity we cannot possibly put the right amount of emphasis on the important things within this kind of program. This is not just money; that is resources of the country. That is the way that we have to operate to get the important things done.

Mr. FLOOD. I have some questions, Mr. Chairman, that I will ask these other people.

OPERATIONAL COMMAND OF POLARIS

Mr. SHEPPARD. During the noon hour, Secretary Quarles, I was thinking over some of your responses relative to this POLARIS situation which happens to be something that I am very much interested in. I would like to propound some clarifying questions on that issue, if I may.

If operational control of the POLARIS submarine is not to go to the Air Force, I assume that these submarines would stay under the operational control of CINCLANT and CINCPAC; is that correct?

Mr. QUARLES. The question of operational control under CINCLANT or CINCPAC is precisely the question that has been put to the Joint Chiefs of Staff. In other words, CINCLANT and CINCPAC are unified commanders. The question on the Joint Chiefs of Staff is whether operational control of these weapons should be in CINCLANT and CINCPAC respectively, or should be elsewhere.

Mr. SHEPPARD. Do you have any personal idea as to the division of authority to which I have addressed myself?

Mr. QUARLES. It has been submitted to the Joint Chiefs of Staff completely without prejudice, and the Secretary of Defense will receive their recommendation—of course without an advance commitment to accept it and act on it. However, this is a normal procedure in operational matters of this kind—that he first receive the advise of his top military advisers.

Mr. SHEPPARD. Am I to construe from your response at this time that you have no preconceived notion about the issue?

Mr. QUARLES. That is right.

Mr. SHEPPARD. How would you coordinate the atomic strikes to be accomplished?

Mr. QUARLES. That is a coordination procedure.

(Discussion off the record.)

Mr. SHEPPARD. In other words, that jurisdiction, once the authority was given for the utilization of atomic energy in combat, would be—if I interpret what you have said properly—more or less vested in the military direction; is that correct, or would that again be something submitted to the Office of the Secretary of Defense for determination?

Mr. QUARLES. Once the unified and specified commanders have received their direction for combat from the Secretary of Defense through the Joint Chiefs of Staff, it would be the responsibility of these commanders to carry out this direction.

Mr. SHEPPARD. Now, insofar as you have reviewed the situation, if you have up to date, how will the POLARIS submarines be supported? Are they going to require separate facilities or would they follow the basic patterns of operational procedure that have been applied heretofore, and been handled through the other submarine programs as we have had them and they have been operational?

Mr. QUARLES. They would be supported by the Navy and by naval logistics support means.

Mr. SHEPPARD. And communications as well?

Mr. QUARLES. And communications similar to those that have prevailed in the past. I think almost surely they will require some new tenders and new arrangements, but I do not think that is what you mean.

Mr. SHEPPARD. Aside from the mechanical aspect which we all know would create some changes, what has prevailed in the past would apply, as you see it?

Mr. QUARLES. That is right. I would expect that to continue, although it is conceivable that there would be some changes in communications arrangements if there were a reassignment of them to another operational command.

Mr. SHEPPARD. Obviously, if they went to the jurisdiction of another command, they would have to be under the complement of the communication under which that command was issuing instructions, or procedurally functioning?

Mr. QUARLES. That is all that I meant to say.

Mr. SHEPPARD. Is it your understanding that the responsibility for worldwide targeting belongs to the Joint Chiefs of Staff under the new concept?

Mr. QUARLES. To the Joint Chiefs of Staff operating under the direction of the President and the Secretary of Defense. It is a staff responsibility rather than an absolute responsibility.

Mr. SHEPPARD. If it is within the jurisdiction of the Joint Chiefs of Staff, would you consider under existing circumstances and procedures as they presently prevail that it would be proper to delegate the responsibility to a subordinate commander?

Mr. QUARLES. I would not think that coordination of targeting systems would be a proper thing to delegate, but once a targeting system has been organized then the execution of it would, of course, be delegated by order from the Joint Chiefs of Staff to the respective commanders.

Mr. SHEPPARD. What I am trying to follow through with is just that, meaning by that if the responsibility is vested in the Joint Chiefs of Staff, obviously the functional aspect would be applied under the field command subject to their designation.

Mr. QUARLES. Exactly.

Mr. SHEPPARD. I am trying to peg that command level aspect here and see what deviation, if any, might be interpreted there under the new control factors.

Mr. FLOOD. Mr. Secretary, I want you to understand that while I asked you that question about Dr. York's jurisdiction and the authority to transfer funds, and the Secretary's understanding of the whole problem, and keeping in mind the three- or four-paragraph statement that you made to me before lunch on your position generally, the reason that I did not pursue it when I got you as a witness was because I understood you had told Mr. Ford that we all understood each other and that was it. There was no sense in my going into it again.

Mr. QUARLES. That is right. That is my understanding.

POSSIBLE REVISION OF BALLISTIC MISSILE PROGRAMS

Mr. FORD. I would like to limit my question to an area which has not been discussed here so far, primarily for the purpose of getting your current views on the ATLAS program, the TITAN program, the MINUTEMAN program, NIKE-ZEUS, and POLARIS.

Last November and December in 1958 when the budget was put together, I assume that you and the Department of Defense subscribed

to the 9-squadron ATLAS program, the 11-squadron TITAN program, and the program in research and development, and to some extent a limited amount of production for the MINUTEMAN program; is that true?

Mr. QUARLES. That is true, Mr. Ford, except it cannot contemplate approval of any production in MINUTEMAN. It did contemplate a priority program for the development of the MINUTEMAN.

Mr. FORD. Then last January 1959, you and Secretary McElroy appeared before this committee and again, as I recall, you and the Department of Defense subscribed to the budget and the execution of it for the fiscal year 1960 as presented.

Mr. QUARLES. That was still our best estimate of a sound program; yes.

Mr. FORD. Now, on April 14, 1959, do you and does the Department of Defense still subscribe to those programs as funded and as laid out?

Mr. QUARLES. I think that I can speak for the Department, but at any rate, you might like to get the opinion of others. I would say we still do subscribe to those programs as funded, and we still are not sure that there is a better apportionment of the funds among those programs than the ones presented. We are, however, restudying it in the light of subsequent experience, particularly the test experience with ATLAS as the most significant aspect of the thing. I would say that it is still possible we feel within the next few months that there could be a better mix, shall I say, of these programs than the ones presented at that time.

Mr. FORD. In other words, the Department of Defense is constantly reviewing the ATLAS program, the TITAN program, the MINUTEMAN program, to determine whether or not in the light of the passing of time we cannot come up with a better solution, dollarwise and programwise, than that which was out together in November and December of 1958?

Mr. QUARLES. That is correct.

Mr. FORD. However, as of the moment, there has been no definitive revision in those programs as originally submitted?

Mr. QUARLES. That is also correct.

Mr. FORD. We had some discussion here a day or two ago about the desirability—last fall and even the desirability today—of perhaps canceling the TITAN program and beefing up the ATLAS program. Is that one of the areas that is currently being discussed?

Mr. QUARLES. That is exactly one of the areas being discussed except I know of no serious consideration of canceling the TITAN program. ——— In thinking over my answer to your previous question, I have realized that I might have given the wrong impression about POLARIS.

Mr. FORD. I would like to talk about POLARIS separately because it is a little different from these three land-based ICBM's.

Mr. QUARLES. If I might make it clear that my previous answer did not comprise POLARIS. I am afraid I might have given the wrong impression.

Mr. FORD. Would any of these changes that you are thinking about, and I use that phrase from the point of view of the Department of Defense, involve any budgetary revisions within the 1960 program?

Mr. QUARLES. It is always possible that it would involve such

revisions, and these revisions might be of either of two kinds—they might be within the total framework of the budget, or they might even be of a character to suggest a change in the overall size of the budget.

At the moment there is no indication that we would propose any change in the budget, but I would not want to say that we are so bound with the thing which has been submitted that we would feel we could not propose a change if it seemed wise.

Mr. FORD. I am certain that this committee would welcome any revisions based on sound decisions, whether they involve dollars or simply reprograming within the overall dollars requested.

I do not necessarily urge that you ask us for more money, but if in the judgment of those who make the decisions that is necessary, by all means I think the request should be submitted.

Mr. QUARLES. I would like to assure the committee that we feel that that is our assignment in the Defense Department, to continue to review these things and to continue to seek the best national answer to them, and I must say we appreciate tremendously the relationship with this committee which enables us to come up and talk frankly about the problem if we see it differently than we did originally.

CHANGES IN POLARIS PROGRAM

Mr. FORD. Might I turn now to the POLARIS program, the budget we have and the program we have before us today. I understand they are essentially the same as those submitted in January, the same as the one put together last fall, the fall of 1958.

Are there any significant changes in that program on April 14, 1959?

Mr. QUARLES. We have taken two expediting steps in POLARIS which I would just like to make clear. One was taken and was incorporated in the budget as submitted. That was the step of advancing procurement of POLARIS submarines Nos. 7, 8, and 9, and that program was released more or less on the first of January, and it has gone forward beyond the original fiscal 1959 program.

Mr. FORD. Is that the one where they are allowed to sign a contract as of July 1, 1959?

Mr. HOLADAY. We had better get this straightened out, Mr. Ford. (Discussion held off the record.)

Mr. QUARLES. Mr. Holaday tells me—and I appreciate his correction because I did not state it quite properly—reminds me that we released the funds for the full program on No. 6 at the first of the year. That was beyond the original 1959 program.

We have recently made arrangements for the Navy to go ahead in preparation for Nos. 7, 8, and 9 with the contract papers and all since it always takes them time to get this worked up, and we believe we will save several months by this advanced release of those submarines Nos. 7, 8, and 9.

Then we have also released funds for some very long leadtime reactor components principally which require many months more than normal leadtime for the Nos. 10, 11, and 12 submarines, the following three which had been shown as long leadtime items in the 1960 budget, so in these three respects I really should say the POLARIS program has been accelerated beyond original plans; but none of these involved any action outside of the appropriation author-

ity that the Congress gave in appropriating the 1959 funds or outside of the authority that the President requested in respect to the 1960 funds.

Mr. FORD. See if I have it correct. You have now given full authority to proceed with submarine No. 6?

Mr. QUARLES. Right.

Mr. FORD. Out of fiscal 1959 funds?

Mr. QUARLES. Right.

Mr. FORD. Authority has been given to the Navy to proceed with submarines Nos. 7, 8, and 9 with the contract to be signed or or shortly after July 1, 1959, which is in fiscal 1960 but out of funds available in fiscal 1959?

Mr. QUARLES. That is right. That date is because that is when the Navy thought they would be ready to sign such contracts; that is right.

Mr. FORD. In addition to that, submarines Nos. 10, 11, and 12 have been expedited by authorizing the Navy to sign contracts for long leadtime items out of funds made available in fiscal 1959.

Mr. QUARLES. That is exactly right. You need another word there. The Nos. 10, 11, and 12 submarines have not been authorized for construction, and the very long leadtime items to which I referred are largely reactor components which take ——— months.

Mr. HOLADAY. ———.

Mr. QUARLES. Procurement there is for materiel which could be used in other programs and therefore does not need to be specifically authorized for these three submarines.

Mr. FLOOD. But these submarines have not been authorized or funds allocated.

Mr. QUARLES. In a strict sense they have not been authorized,

Mr. FORD. Am I correct that in the fiscal 1960 budget there is not obligational authority for the full funding of Nos. 10, 11, and 12 of the POLARIS submarines?

Mr. QUARLES. That is right, nor do we feel that there will need to be.

There is, however, authority for many leadtime items beyond the very long leadtime items that I am now speaking about.

This was only $40 or $45 million.

Mr. HOLADAY. I think it was less than that.

Mr. QUARLES. At any rate, it was a relatively minor amount of reactor procurement for Nos. 10, 11, and 12 submarines.

They are in the 1960 budget for long leadtime procurement but not for complete authorization and building.

Mr. FORD. Is it your view and the view of the Department of Defense that the money that is in the fiscal 1960 budget for Nos. 10, 11, and 12 is adequate for the kind of program we ought to have even though it is not for full funding of the construction of the three boats?

Mr. QUARLES. That is our present view. However, the remarks I made earlier about our continuing study of ATLAS, TITAN, MINUTEMAN, and so on, would also apply to POLARIS and similar studies are being made in the POLARIS area.

Mr. MAHON. I wanted to make an observation and ask a question.

I am not sure that the testimony shows what I want to get in the record.

Normally in the Defense budget a request is made to fund certain programs. The Defense Department does not know whether the funds will be appropriated or not, and therefore you can make certain plans but they cannot be very definite.

You have had the funds for the last three submarines, and therefore you can proceed as you have outlined here in your testimony.

Mr. QUARLES. That is correct.

Mr. MAHON. About how much time have you been able to buy, by reason of having these funds readily available for utilization in the POLARIS program?

Mr. QUARLES. We bought something in excess of 6 months on No. 6 because that had not been in the President's program for 1959 originally.

Then we are buying, through this release procedure I mentioned earlier, perhaps another 3 or 4 months, it is hard to say exactly, by getting ready now contracts for things for which we know we have obligational authority and would not have known we had obligational authority for it if it had not been appropriated in 1959.

Mr. FLOOD. That is for Nos. 7, 8, and 9.

Mr. QUARLES. That is right.

NIKE–ZEUS PROGRAM

Mr. FORD. What is the current attitude of the Defense Department and yourself in reference to NIKE–ZEUS?

Mr. QUARLES. When we set up the 1960 program in the late fall we gave NIKE–ZEUS very careful consideration, and the issue, of course, was whether or not we should proceed with production arrangements at this time.

There was agreement all around, including our scientific advisers, Joint Chiefs of Staff, and everyone, that NIKE–ZEUS had such promise in an area of such importance that we should press ahead with priority on the development of NIKE–ZEUS, and funds were provided in the budget where I think all are agreed provide for priority development of the system.

Beyond that the question was whether we should put funds that we call advance production funds, advance preparations for production, into the program.

After very careful consideration it was decided not to do so, and the present 1960 budget program for NIKE–ZEUS provides for this high-priority development but not for production arrangements.

I must say there is some difference of opinion about this. I think the scientists all agree that there is a very considerable uncertainty as to how effective any antimissile missile system that we can now design could be or would be.

On the other hand, this is a very important area, of course, and one where great security values are involved.

In balance it was the judgment, and I will say it is my judgment, that we are not ready for the production of the NIKE-ZEUS system and that it is wise to wait until we have seen more tangible evidence of its effectiveness by test and until we can appraise better than we have yet done the possibility of the system being spoofed by relatively inexpensive measures that the Soviets might use.

I can say I am right where the budget is on that matter. I cannot claim unanimity on that point, but there is certainly, generally speaking, Chiefs of Staff support for it excepting for one member of the Chiefs of Staff, and there is a divided scientific opinion but I think the weight of the scientific opinion is also on the side I have expressed.

Mr. MAHON. Off the record.

(Discussion held off the record.)

Mr. FORD. What would be your comment on NIKE-ZEUS at this point, Dr. York, since we are in an area which perhaps is more research and development than almost anything else?

Mr. MAHON. Why not go into that later, Mr. Ford?

Mr. FORD. This is my last question and I would like to have it as a continuous interrogation.

Dr. YORK. I will expand on it later if you would like to ask again.

Right now, briefly, my office is one of the sources of recommendations to Mr. Quarles on this subject, and our recommendation was essentially accepted. It happened to be identical with the Joint Chiefs' recommendation so I do not know whose recommendation was accepted, but that was to go ahead with the research and development program at the level which has been recommended and not to go into production of the system.

I can expand on that later if you would like.

Mr. SHEPPARD. Mr. Weaver?

ATLAS VERSUS TITAN

Mr. WEAVER. In testimony of the past few days here, Mr. Secretary, it has been brought out that about 9 months ago the decision was made to go ahead and concentrate on TITAN and not put crash emphasis on the ATLAS program.

It was also brought out in the testimony that there was some area of disagreement and controversy among the officials who made the final decision.

What was your opinion at that time, sir?

Mr. QUARLES. My opinion was that the program that was proposed was the sound program. In other words, I recommended the program as it stands. I did it from the best information I had at that time as to the progress on the ATLAS missile.

We recognized that there were uncertainties in ATLAS, although it offered substantial time advantage over TITAN.

We recognized that TITAN potentially offered substantial performance advantages over ATLAS, and everything considered it seemed wise to play ATLAS for the near term squadrons and to rely on TITAN as the longer range, you might say, standard of this kind of weapon.

Since that time test results have substantially increased our confidence in the ATLAS program, and in fact also our expectation of performance in the ATLAS program.

Nothing has happened to decrease our confidence in TITAN, so I do not mean to give any impression of that kind, but the net effect of this is to make one feel today that as a backup for ATLAS, TITAN is not nearly as important as we then thought it might be.

It is still my view that down the road TITAN must be expected to be a somewhat superior weapon, so that probably we should take time

to make TITAN the kind of long-range standard we would like to have, and perhaps we orient the program to play ATLAS more strongly in the near term.

That is exactly what we are now studying as a possibility.

Mr. WEAVER. On that point would you be in favor of increasing funds for the ATLAS program to provide an additional half a squadron a month or an additional squadron every other month as several here have testified recently?

Mr. QUARLES. We are not ready to make that recommendation. An additional squadron a month, quite aside from the production problem, would involve us in very heavy basing, deployment, and training problems.

I can only say that we believe it would be practical to increase the rate of ATLAS deployment somewhat. Whether it would be practical and desirable to do that, cutting back on some of the other programs in the missile area, or whether funds might to better advantage be put on ATLAS than on some of the other programs that are in the budget, are all matters that are receiving intensive study at the present time.

OPERATION OF NIKE-AJAX

Mr. WEAVER. About 10 days ago I visited the Presidio in San Francisco and saw a NIKE-AJAX battery which was quite intriguing to me. As you know, it is quite an investment financially.

When I talked to the commanding officer of that installation and asked him what sort of a duty status they were on, he said that they operate, as I understood him to say, ———. They do, however, use this installation for training purposes, but it is one of the main NIKE batteries within the San Francisco area.

Later I was informed by two colonels, or a colonel and a lieutenant colonel from the Department of Defense, that at all the NIKE installations in this country, and this perhaps should be off the record.

(Discussion off the record.)

If you have further information that you can supply for the record I would appreciate it.

Mr. QUARLES. I would be glad to.

(A classified statement was furnished the committee.)

COMMENDATION OF MR. QUARLES

Mr. FLOOD. I do not want to impose the "kiss of death," and coming from me it could easily be that, and perhaps you have too much sense: However, under all the circumstances and under our constitutional method of government, and it being this late in this administration as it would be in any administration, and in view of your long experience, I would like to say you have given the best performance today by a hundredfold that you have ever given—"performance" is my word—and certainly while I do not speak for this committee, but, knowing them as I do, the President in his wisdom would help considerably, if Mr. McElroy retires, to realize you would make a good Secretary of Defense under all these circumstances. I limit it to the circumstances.

Mr. QUARLES. Mr. Flood, I hope if I have improved a hundredfold that I can keep on improving at that rate because I ought to be pretty good at that rate.

Mr. FLOOD. You have been around too long and perhaps have too much sense. I am very serious about it.

Mr. MAHON. You think there is a gross potential?

Mr. FLOOD. Yes; and I have been no Quarles fan, for obvious reasons.

Mr. QUARLES. I don't know how obvious they are, but, anyway, I will accept that as a very fine compliment, Mr. Flood, and I appreciate it.

Mr. FLOOD. I mean it that way. You surprised me.

Mr. QUARLES. I would like to say that in my estimate of the national welfare the longer Mr. McElroy can remain as Secretary of Defense the better it will be for the country, sir.

Mr. FLOOD. I agree with that. I am speaking beyond that.

NATIONAL INVENTORS COUNCIL

Mr. SHEPPARD. You have been very complimentary. Let me finish a question if you will, please.

Under the former arrangement we had here, and during the impact of war activities, the people of the Nation had certain ideas regarding specific places in Government where they might bring to our attention something of an improved character.

What office do we have today where X scientist can go, whether he be recognized or not, when he has a development which is worthy of consideration? Where can he go?

Mr. QUARLES. The X scientist being a man outside?

Mr. SHEPPARD. Yes, not talking about those presently in the service or otherwise. For example, the Air Force is interested in a manned bomber operation. People have been in that field for some years and they have created what they think is something worthy of consideration in that type of operation. Where could they make a presentation? What is available for them?

Mr. QUARLES. There is the National Inventors' Council with which you are perhaps familiar which is organized precisely for the purpose of entertaining the ideas of people any place in the country, entertaining ideas of anybody.

As those ideas flow in, a big fraction of them do not deserve consideration. Some small fraction does.

Mr. SHEPPARD. If you got 1 out of 50 you would be fortunate.

Mr. QUARLES. Exactly. I may say that is a good deal higher than the current ratio, but nevertheless every one that we do get, we are indeed, fortunate.

When the Inventors Council finds one which in their estimation deserves further consideration as possibly being useful, if it is in the defense area they would refer it to the Secretary of Defense or probably to the Director of Defense Research and Engineering. He has in his shop an office which also deals with these new ideas. Some of them, in fact, will be directed to the Secretary of Defense and some to Dr. York.

They all get filtered and considered, and I think sympathetically considered.

Mr. SHEPPARD. How difficult is it for a person to have an interview with somebody who would have enough understanding of the problem

they presented, let us say to evaluate it in an hour's time, using that as a hypothetical situation?

Mr. QUARLES. I think it is not too difficult. The Inventors Council has arrangements and it has the personnel there who have the kind of competence you speak of.

If they come into the Department of Defense there are places in the Office of the Secretary of Defense and in the offices of the military Departments where this can be done.

DEFENSE DEPARTMENT EVALUATION OF UNSOLICITED RESEARCH AND DEVELOPMENT PROPOSALS

Mr. SHEPPARD. When you get into the military departments we are getting on soft soil.

I speak of one thing evaluated by two branches of Government. They say:

> There is no question about the fact it is possible to do this and it looks promising. However, there is only one thing you can do with a thing like this—you can take it to any one of these three firms—

and they name three firms operating in this field.

They say:

> Present it to them and if they approve of it we will look at it.

Is that not circumventing the entire situation if their idea has merit?

Mr. QUARLES. It would be an unusual procedure, and generally speaking it would not be the best procedure to refer a person of that kind to private firms. That is not the way we generally operate.

I do not know the particular circumstances——

Dr. YORK. You can imagine special cases where that might be correct.

Mr. SHEPPARD. What is that, please?

Dr. YORK. You can imagine special cases where that might be the right thing to do.

Mr. SHEPPARD. Am I to assume, then, that under the circumstances of the people who are charged with the responsibility for sifting presentations of this character that we reach a conclusion if they should go into that category, and if we do where do we reach such a conclusion if they should go into that category, and if we do where do we reach such a conclusion? Where is the Federal Government itself interested in an innovation if their scientific evaluators say it has merit?

Dr. YORK. Perhaps I should not have interrupted.

Mr. SHEPPARD. I am glad you did.

Dr. YORK. What I had in mind is this: If we have a group working on some specific program, perhaps some industry working on PERSHING, for example, and the particular idea that has come in is for making a better nozzle for exactly that size of rocket, that might be referred to whoever was the prime contractor on that job.

Mr. SHEPPARD. I do not want to keep you here, Mr. Secretary, because we would like to have you go.

Mr. QUARLES. Thank you.

Mr. SHEPPARD. I wish you would put in the record if you will at this point, Dr. York, the sources of entree for people of the type I have just referred to.

Dr. YORK. There are really quite a few ways, sir.

Mr. QUARLES. We will be glad to supply that information, Mr. Chairman.

(The information requested follows:)

DEPARTMENT OF DEFENSE PROCEDURES FOR EVALUATING UNSOLICITED RESEARCH AND DEVELOPMENT PROPOSALS RECEIVED FROM OUTSIDE SOURCES

It is well recognized by the Department of Defense that significant progress made in improving the Nation's defense capability largely depends on the quality and quantity of new research and development work proposals received from sources outside the Government as well as from inside. Experience has also shown that it is inherently difficult to promptly recognize the potential value of new ideas and that the discoverer or inventor of an original concept is not always well understood or appreciated by his contemporaries. For these reasons, the Department of Defense has established specific offices within its various echelons for handling new research or development proposals. The National Inventors Council, although under the Department of Commerce, is primarily engaged in handling proposals related to defense applications received from outside sources. A close liaison is maintained between all of these offices.

Proposals received by the National Inventors Council are given a preliminary evaluation by that agency. Those considered to have merit and which have defense implications are sent by the council directly to the defense agency or agencies considered to have the greatest interest and specific competence for further consideration. The proposer is kept informed of the action being taken and the final outcome of the evaluation made. In those instances where a defense agency wishes to adopt or pursue a given proposal, the proposer is contacted directly by the agency for further negotiations.

Within the Office of the Secretary of Defense, the Director of Defense Research and Engineering is responsible for effecting an evaluation of proposals sent to the Secretary of Defense or referred to him by other agencies of the Government. Many proposals are received through this channel, either directly from an outside individual or company, or as referrals from the White House, Members of the Congress, etc.

Each of the military departments also has an office which has the specific responsibility for processing new proposals. These offices work closely with each other and with the Office of the Director of Defense Research and Engineering to insure that each suggestion is given the widest possible consideration throughout the Defense Department. The three service offices are as follows:

Chief of Research and Development, Office, Chief of Staff, Department of the Army, Pentagon, Washington, D.C.

Inventions Evaluation Branch, Office of Naval Research, Department of the Navy, Munitions Building, Washington, D.C.

Deputy Chief of Staff, Development, Department of the Air Force, Pentagon, Washington, D.C.

Proposals that come to the attention of the Department of Defense vary widely both in form and substance. Many factors, in addition to technical merit, require consideration in weighing the potential value of each new suggestion. For these reasons, the actual review and evaluating procedure used is determined by the requirements of each case. Procedures are purposely maintained as flexible and informal as possible consistent with the need to consider each proposal thoroughly, promptly, and sympathetically.

For example, all that one needs to do to arrange a prompt hearing on any proposal is to write to any one of the three military departments, the Office of the Secretary of Defense, the National Science Foundation, or call in person at any of the above offices in Washington, or their regional field offices.

Many agencies in the Department of Defense are responsible for conducting or soliciting research and engineering services from outside sources. Proposals solicited to meet specific requirements are negotiated directly by these agencies.

COMMENDATION OF MR. QUARLES

Mr. SHEPPARD. Personally I very much appreciate the manner in which you have made your presentation. It has been very interesting.

If I may reduce my comments to perhaps the untarnished language of the man on the street instead of that used by my colleague, Mr. Flood, you have learned to let your hair down considerably and it is a wonderful asset.

Mr. QUARLES. I have lived and learned.

Mr. SHEPPARD. Thank you very much, Mr. Secretary.

Mr. QUARLES. It has been a pleasure to be with you.

Mr. MAHON. You have done a fine job, Mr. Secretary.

Mr. QUARLES. Thank you, sir.

Mr. MAHON. Thank you.

Mr. Johnson, we will ask you to proceed at this time with your presentation of the actual money requirements for advanced research projects.

(Discussion held off the record.)

VANGUARD PROGRAM

Mr. SIKES. I notice poor VANGUARD has failed again to go into orbit. I recognize that all missile failures are successes; that the operation must always be a success even though the patient dies. Why do we keep the VANGUARD program going when it seems to have been particularly devoid of successful operations?

Dr. YORK. We do not keep it going. That is in the NASA program. It appears nowhere in the Department of Defense program.

Mr. JOHNSON. We transferred it from ARPA to NASA on October 1. We did cancel attempts last fall before transfer because of our basic concern that the bugs were not out of that system. It is a very sophisticated system. As Secretary Quarles testified a year ago, perhaps we overengineered it, and it has inherent difficulties because so many things have to be exactly right.

Mr. SIKES. When you transferred it did you make recommendations that it continue in the program or not?

Mr. JOHNSON. Our recommendations were neither. We did recommend that it be carefully studied and restudied by people who had not previously worked with it to evaluate its usefulness in the future.

Dr. YORK. We had in fact carried on such a study ourselves just prior to that and passed on to them such information as we had.

Mr. SIKES. Had it been proper for it to be continued in your program, do you think you would have washed out the VANGUARD or kept it going?

Mr. JOHNSON. That is a very speculative question. I think it is almost impossible to answer what the DOD total position would have been. My personal position would have been to have canceled it, but that does not speak for the Department of Defense.

MINUTEMAN PROGRAM

Mr. SIKES. I listened with considerable interest to what was said a few moments ago on TITAN and ATLAS.

There seems now to be some speculation regarding the need for the MINUTEMAN program. There seems to be some doubt that MINUTEMAN is really going to do as many things and do them as

well as we had at first anticipated, although it still seems to have a valuable place in our program.

What is the general thinking insofar as you gentlemen are concerned regarding the present requirement for the continuation of the MINUTEMAN program?

Dr. YORK. There is no doubt, and Mr. Holaday might want to say something on this, too—that we want to go ahead with MINUTEMAN or something very, very much like it.

It is different from ATLAS or TITAN. It won't do what ATLAS and TITAN will do in the sense of delivering so ———. It has a definitely smaller capability.

On the other hand, it will deliver a tremendous explosion. Sometimes we forget just how big a kiloton is and the MINUTEMAN is ——— in terms of capability. That is an enormous explosion and it will produce an enormous amount of damage.

Rangewise it is essentially the same.

(Discussion off the record.)

Dr. YORK. But this is something which can be corrected if we have good luck. It certainly can be changed as we go along.

In terms of some of the other things that are important about a missile, there is some dispute but I think, and so do many others, that there are many advantages in such matters as readiness and reliability, and also in ruggedness. That is, it is smaller and easier to defend, easier to make hard, easier, also, to make mobile because it is smaller.

Its readiness is better because the solid system involves a smaller number of parts, does not involve having to fill tanks and things of that sort.

Reliability comes about also from the smaller number of parts.

There will be a time during which ATLAS is more reliable than MINUTEMAN simply because there has been more experience, but intrinsically systems of the MINUTEMAN type should be more reliable.

They do not displace the liquids, though, because the liquids for a given weight can deliver more of a payload and it is my personal opinion that they will be maintained. As we go along with development it will always be so that the liquids can actually deliver more than the solids but the solids will be more reliable, mobile, and ready.

REPORT OF COMMITTEE SURVEYS AND INVESTIGATIONS STAFF ON PROJECT VANGUARD

Mr. SHEPPARD. At this point we will insert a report to the Committee on Appropriations, U.S. House of Representatives, on project VANGUARD.

(The report referred to follows:)

PROJECT VANGUARD, A SCIENTIFIC EARTH SATELLITE PROGRAM FOR THE INTERNATIONAL GEOPHYSICAL YEAR

A REPORT TO THE COMMITTEE ON APPROPRIATIONS, U.S. HOUSE OF REPRESENTATIVES, BY SURVEYS AND INVESTIGATIONS STAFF

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I. INTRODUCTION

The Committee on Appropriations instructed the staff, by directive dated March 19, 1958, to inquire into the reliability of our modern weapons. During the course of the study the staff was directed by letter dated October 16, 1958, to review the VANGUARD project. The communication stated:

> It will be greatly appreciated, if you will request the staff making a study on weapons reliability and related matters, authorized by the directive dated March 19, 1958, to specifically look into the VANGUARD project. It appears that this project has been a relative failure compared to other similar efforts. The committee should be fully informed regarding the pros and cons of this project from a reliable source outside the Department of Defense as early as possible in the next session.

A report covering all phases of the inquiry into the reliability of weapons was submitted on December 22, 1958. The present report is devoted to Project VANGUARD.

The request upon which this inquiry is based carries the clear implication that the committee is concerned about the validity of the commonly held public belief that Project VANGUARD is a failure. The facts developed by the study staff in its efforts to probe the pros and cons of the program do not confirm this common belief. It is, however, easy to see the reasons for such a feeling and to understand why it exists.

The VANGUARD program was conceived in presputnik 1955 in an aura of unwarranted, but nonetheless real, national complacency concerning the technical supremacy of the United States. It was planned as a comparatively low-level, economical effort and was not to interfere with the ballistic missile developments. The entire program consisted of 15 vehicles. Six of these were test vehicles, TV's three were reserve or backup test vehicles, TV–BU, and six were

planned as vehicles having satellite launching capability, SLV's. Six test vehicles were considered the absolute minimum essential for the development program, and these were to be fired before any attempt was made to launch a satellite. The last six to be fabricated were to be modified to correct any weaknesses disclosed in the testing program, and it was thought there was reasonable assurance that at least one of them would succeed in placing a small scientific satellite in orbit sometime during the International Geophysical Year—July 1957 to December 31, 1958. The planning documents reviewed and discussions with scientists interviewed by the staff disclose that at the time VANGUARD was initiated the general feeling in the scientific community was that getting one instrumented satellite into orbit during IGY would represent a tremendous accomplishment. Getting more than one out of the six tries would be a desirable but unexpected bonus.

The VANGUARD launching vehicle was a new development and, as was to be expected, encountered technical difficulties which caused slippages in the optimistic schedules initially prepared. Test vehicle No. 4, TV–3, was almost ready for delivery when Sputnik I and II were placed into orbit. It was to be the first test of the complete VANGUARD rocket and the first flight test of the newly developed second-stage motor. Nevertheless, previous tests had been fairly successful and plans had been made to have TV–3 carry a small sphere which, if all went well, might have orbiting capability. Despite the fact that this was only the fourth test shot in the development program and that only phenomenal luck would produce a satellite, national attention was focused on it. An OSD public information officer led a troop of reporters to Cape Canaveral to witness and report the event.

The TV–3 test shot failed in the most miserably spectacular manner possible—it burned on the launch stand. A duplicate of TV–3 was fired 6 weeks later but did not succeed in achieving an orbit. TV–4, the sixth shot in a series of tests, was fired on March 17, 1958. The rocket performed perfectly and succeeded in placing a small instrumented satellite into orbit. Since that time four vehicles have been launched. None have been completely successful, although SLV–3, the last one fired, very nearly placed a fully instrumented 20-pound satellite into orbit.

The program was never allowed to complete its development test programs. Instead, it was called upon to produce a satellite on its fourth test shot (the first vehicle to have orbiting capability), and since that time each VANGUARD rocket fired has been expected by the public to be successful, i.e., to produce an orbit. Because this has not been done, the program has been condemned by the news media as a failure. It has borne the burden of a hurt national pride—hurt because Sputnik I was in orbit before any U.S. satellite and because Sputnik II was many times larger than the VANGUARD satellite.

It may be possible, in hindsight, to decry the impotence of our 1955 national effort in the field of space research, to question the wisdom of those who elected to pursue our satellite launching efforts independent of ballistic missile developments, and to criticize the failure to recognize the importance of granting the satellite program

priorities equal to those enjoyed by the major missile programs. These criticisms, however, cannot fairly be the basis upon which to judge Project VANGUARD; they must be addressed to those who felt that the VANGUARD approach was adequate for our national needs and who set the course accordingly.

In its review the staff has endeavored to evaluate VANGUARD within the limits imposed on the project by national policy, as evidenced by the official decisions referred to herein, and without regard for the results accomplished by other countries.

As will appear in the report, our analysis disclosed that mistakes were made in the program, that some degree of mismanagement existed and that, in at least some instances, quality control was not as good as it should have been. The fact remains, however, that VANGUARD was brought to "operational" stage in less than half the time required by most missile developments. On its third "try" it placed a small satellite in orbit. The orbit of this satellite is by far the most stable of any earth satellite launched to date (as it never gets closer to the earth than 400 miles, it is not appreciably affected by the earth's atmosphere), and it has already led to an important discovery concerning the shape of the earth. The VANGUARD development has contributed a number of advances to the state of the art, some of which are set forth later in this report. Some of the other satellite launching vehicles have utilized principles proven through the VANGUARD program. It is anticipated that further moon probe shots and attempts to launch heavier satellites will employ VANGUARD-proven components.

In the overall appraisal and without endorsing the selection of VANGUARD as a launching vehicle or the level of effort that was applied, it must be concluded that those responsible for implementing the program within the ground rules established have done a commendable job.

II. SELECTION OF PROJECT VANGUARD

The three military services for several years prior to 1955 had been conducting upper air research programs of varying magnitude. There was, however, no real major effort in any of the military departments, and there was little coordination or direction at the OSD level of the limited programs being pursued.

Late in 1954 the International Scientific Committee that was planning for the International Geophysical Year, IGY, discussed satellite vehicles as a possible means of obtaining scientific information about the upper atmosphere. The Committee recommended that the groups preparing individual national programs in support of the International Geophysical Year consider the launching of small satellite vehicles for scientific purposes during the period of the IGY, July 1957 through December 1958. The U.S. National Committee for IGY, established under the auspices of the National Academy of Sciences, formed a group to study the feasibility of including an earth satellite activity in the U.S. program for the IGY.

The impetus provided by the suggestion of an IGY satellite aroused increased interest on the part of the military services in developing "space" programs. In March 1955 the Assistant Secretary of the Navy for Air sought approval of a program which included plans for

placing a simple, uninstrumented satellite in orbit in 2 or 3 years. The program, known as Project Orbiter, was a joint one with Army Ordnance and was based on the use of the REDSTONE booster and LOKI rockets.

Consideration of this request called attention to the fact that the three military departments were taking unilateral actions on space programs, and on March 28, 1955, the Secretary of Defense issued a memorandum directing the Assistant Secretary of Defense (ASD), Research and Development, (R. & D.), to coordinate all research and development plans for earth satellites, and instructing the three military departments not to commit further funds for such projects without prior approval of the ASD (R. & D.).

In April 1955 the ASD (R. & D.) directed his coordinating committee on general sciences to review the plans and programs of the three departments and to submit recommendations for action. The coordinating committee, which was composed of representatives of the military departments, recommended that the satellite program be conducted on a three-service basis with three separate approaches:

1. A joint Army-Navy project utilizing the REDSTONE booster and LOKI rockets—Project Orbiter.
2. A Navy proposal using VIKING as the first stage of a three-stage rocket.
3. An Air Force proposal using the ATLAS engine as booster and the AEROBEE-HI as the second and final stage.

While these proposals were under consideration, the President directed the Secretary of Defense to develop the capability of launching a small satellite during the IGY. Thereafter the ASD (R. & D.) convened a group of civilian consultants to advise regarding the selection of a specific technical program. The group was identified as the Advisory Group on Special Capabilities (also referred to as the Advisory Group and the Stewart Committee), and consisted of eight members, two recommended by each of the military departments and two selected by the ASD (R. & D.). They were instructed to review the various satellite plans and programs and to recommend an equipment program by August 1, 1955, including suggestions with regard to the governmental and industrial organizations where the different phases of the program might best be carried out and a consideration of the impact of the recommended program on weapon development projects.

The group submitted its report on August 4, 1955. It recommended the development of a scientific satellite vehicle in two phases: (1) An immediate program designed for maximum assurance of placing at least a small (5- to 10-pound) satellite in orbit during 1958, and (2) a program to launch a vehicle capable of carrying a satellite of significantly larger payload (up to 2,000 pounds) or of achieving a significantly higher orbit at some future date. Other findings included:

1. There is a reasonable assurance the United States can have the capability to put up a small scientific satellite during 1958.
2. Use of current military programs to accomplish the objective within the IGY period will run some risk of interference with such military programs but if properly carried out can result in long-term benefits to the military programs.

3. The group unanimously favored use of the ICBM (ATLAS) motor if (*a*) the ICBM program would be on schedule, (*b*) the satellite effort would not interfere with the ICBM, and (*c*) only a single satellite program could be approved.

4. The group declined to resolve the "ifs" (in 3) and presented two alternatives: (*a*) Use of the Navy proposal based on an improved VIKING rocket with two additional stages (this proposal was favored by five of the seven members participating), and (*b*) use of the Army proposal based on the REDSTONE missile with three additional stages (this proposal was favored by two members of the group).

The Committee considered proposals of the Army, Navy, and Air Force against the primary question: What program will be most certain of placing the most useful satellite vehicle on an orbit of at least 150 to 200 statute miles perigee (minimum altitude) within the IGY and with minimum interference to priority military programs?

The majority reached the conclusion that the Navy's VIKING proposal was superior to the REDSTONE proposal, principally because—

1. The VIKING booster offered better performance and more reserve margin.

2. VIKING required only two additional stages, whereas REDSTONE required three or four.

3. The VIKING'S first-stage engine could be made available without interference from or with weapon projects.

4. One agency, Naval Research Laboratory, had extensive experience with the VIKING, with the second stage, and with upper-atmosphere research equipment.

5. VIKING appeared to require less logistical support.

6. The associated Aerobee-Hi development would probably be used in more advanced satellite programs.

7. Improved VIKING components might eventually be used as a second stage with an ICBM booster to achieve still greater performance.

8. The fact that VIKING project had been declassified was thought to simplify the handling of security problems and to increase the amount of technical data that might be released.

The minority (two members) gave five reasons why they favored the REDSTONE, but the summary said:

The greater flexibility of the REDSTONE as a launcher for a satellite is considered to be the primary reason for its choice in a program having as short a time scale as the IGY period, since it makes it possible to compensate for unforeseen development difficulties.

In a memorandum directed to the Chairman of the Advisory Group under date of August 15, 1955, the Assistant Chief of Army Ordnance said the report of the Group contained some errors of fact, and some errors of reasoning about what can and cannot be done on a given time scale. He also said there were some factors not considered by the Advisory Group and, among other things, pointed out that—

[1] The substitution of the 135,000-pound North American rocket engine for the current 75,000-pound engine in the REDSTONE missile is a less complicated operation than the design of a new VIKING missile. * * * There is greater assurance the REDSTONE with 135,000-pound motor will be available within a 2-year period. Actually the first orbital flight of this improved REDSTONE motor can take place in August 1957. * * * Using three-scaled SERGEANT

high speed stages, a payload of 162 pounds can be placed in an orbit with a perigee of 216 miles. Payload can be traded for excess velocity. There is sufficient excess velocity to place a 100-pound payload on the moon.

[2] The development problems confronting the VIKING development make it obvious that the probability of success within the IGY is low. This conclusion is reinforced by looking at the development times of major missile programs already completed. Such programs are rarely completed on the originally predicted dates and require 5 years at the minimum and usually run for approximately 8 years.

[3] The improved REDSTONE 75,000-pound performance permits improved payloads at orbitable altitudes. The following table was computed with 900 feet per second excess velocity and with existing propellants:

Perigee altitude (miles):	*Payload (pounds)*
300	6
216	18

The first orbital flight for this configuration can be scheduled for January 1957 if an immediate approval is granted. Since this is the date by which the U.S.S.R. may well be ready to launch, U.S. prestige dictates that every effort should be made to launch the first U.S. satellite at that time. Although this time scale is dependent on SERGEANT or Loki clusters, the engineering feasibility has been approved by four competent agencies.

[4] The satellite missile does not interfere with the REDSTONE missile program because the program is in process of being turned over to the Chrysler Corp. and because the designers and planners are completing their work with the REDSTONE missile. A new program is therefore necessary for adequate utilization of the talent available. If a new and challenging project is not soon placed at Redstone Arsenal, the loss of key personnel will jeopardize the successful completion of the REDSTONE missile project. Therefore the scientific satellite program will strengthen rather than weaken the REDSTONE missile project.

[5] In view of the fact that Army Ordnance can provide heavier orbital payloads with shorter time scales and with greater assurance of success, and that the Naval Research Laboratory is already heavily committed to the Aerobee-Hi development for the IGY, it is obvious that the Naval Research Laboratories will be better employed instrumenting properly the large payloads (100 pounds or more) which can be made available.

Based on this memorandum, the Advisory Group held further sessions and both the Redstone sponsors and the Navy VIKING group made presentations. The minutes of the Advisory Group state that they found no reason to reverse their previously expressed views favoring the Navy proposal.

Following receipt of the Advisory Group's report, the Assistant Secretary of Defense (Research and Development) referred the report to his Policy Council for advice on interservice cooperation and consideration of the possibility that the scientific satellite program might interfere with the weapons program.

After extensive deliberation, the Policy Council (Army members did not agree) recommended the selection of the Navy proposal for a three-stage launching vehicle based on the VIKING and Aerobee-Hi rockets.

It appears that the Air Force proposals for launching vehicles based on ICBM motors were rejected because of possible interference with the weapon development program. The decision to use the Navy-proposed VIKING approach instead of the Army REDSTONE was based primarily on the technical recommendations of the Advisory Group on Special Capabilities, as previously set forth.

On September 9, 1955, the Deputy Secretary of Defense (Reuben Robertson), by directive to the Secretaries of the military departments, promulgated the ground rules for the satellite project. The directive based on instructions from higher authority provides for a program to launch a scientific satellite during the period of the IGY.

The staff has been unable to obtain access to the instructions from higher authority but has been advised by a representative of the Secretary of Defense that important provisions were:

1. The satellite program was not to interfere with weapon developments.
2. The objective was to put one satellite in orbit during the IGY.

The directive referred to above gave the Department of the Navy management responsibility for the technical aspects of the program, and provided for cooperation by the Army and the Air Force in the satellite project which became known as Project VANGUARD, or simply VANGUARD.

As noted, the Army members of R. & D. Policy Council did not agree with the decision to pursue the satellite program through development of the Navy proposal. On two separate occasions during 1956 the Army formally sought approval for a satellite-launching attempt based on its missile developments. In April it informed the Advisory Group on Special Capabilities that an Army satellite program would permit the firing of a JUPITER in January 1957 in an effort to orbit a small body. The effort would require 6 vehicles, $18 million, and delay the IRBM (JUPITER) program approximately 6 months. This request was rejected and the Army was specifically instructed not to use any part of the JUPITER or REDSTONE programs for scientific satellites.

Following the successful JUPITER firing in September 1956, the Secretary of the Army recommended to the Secretary of Defense that a six-vehicle program based on REDSTONE be approved as a backup to the VANGUARD program. It was decided not to provide a backup for VANGUARD because that program, on review, showed promise of meeting its IGY objective.

Again, in March 1957, the Army proposal was considered and rejected, this time by the Special Assistant for Guided Missiles (Dr. Eger Murphree). In a memorandum for the Secretary of Defense dated March 21, 1957, Dr. Murphree said that if VANGUARD was to accomplish its mission a large amount of work would have to be successfully completed in a relatively short time. He pointed out it was not unlikely that real difficulties might be experienced which would cause a very real delay in the program; in this event it might be desirable to turn to the Army-type satellite, three stages of which had already been successfully launched. He called attention to the fact that the Army Ballistic Missile Agency (ABMA) claimed it could launch a satellite on 4 months' notice, and recommended that the VANGUARD program be reviewed again about the end of 1957 to see if a backup to the program by ABMA was desirable at that time.

A review in accordance with the above recommendation was never made. Sputnik I was placed in orbit on October 4, 1957. Sputnik II was placed in orbit on November 3, 1957. On November 8, 1957, the Secretary of Defense directed the Department of the Army to proceed with preparations for launching a scientific satellite by use of a modified JUPITER-C which had been developed in connection with the nose cone reentry problem. The vehicle was launched on January 31, 1958, and succeeded in placing in orbit a satellite weighing almost 31 pounds. This consisted of a burned-out final stage weighing about 13 pounds and a satellite proper weighing about 18 pounds.

The first stage of the JUPITER-C rocket was powered by the REDSTONE ballistic missile engine, which had been under development for many years. The particular unit employed had undergone successful static-test firing and had been in storage at Redstone Arsenal since November 1956. The upper stages were solid propellant units designed specifically for the reentry test vehicle. As of February 15, 1958, this satellite was in orbit and was producing data of scientific value.

III. HISTORY OF PROJECT VANGUARD

Vanguard, a part of the U.S. scientific satellite program of the IGY effort, comes under the policy jurisdiction for scientific matters of the National Academy of Sciences (NAS—a quasi-governmental organization) and its suborganizations—committees—for the IGY. The National Science Foundation (NSF—a Government agency) has acted as agent for NAS in formal relationships with other governmental agencies. Overall management of the project was, however, centered in the Department of Defense (DOD) until October 1, 1958, when it was transferred to the National Aeronautics and Space Agency (NASA).

As previously noted, the Secretary of Defense, on September 9, 1955, gave the Department of the Navy managment responsibility for the VANGUARD. Within the Navy Department this responsibility was delegated through the Chief of Naval Research to the Director of the Naval Research Laboratory (NRL), who gave technical responsibility and project authority to the Director, Project VANGUARD (Dr. John Hagen). Actual contracting authority was retained by the Office of Naval Research, parent organization of NRL.

The Glenn L. Martin Co., Baltimore, had been the prime contractor for the VIKING rocket and on September 23, 1955, a contract was entered into with that company for the VANGUARD launching vehicle. The contract carried with it responsibility for development of the vehicle including design, construction, testing, and preparation for flight. It provided for a 6-vehicle flight test program for which 9 test vehicles (TV's) were to be fabricated, and for 6 vehicles having satellite-launching capability (SLV's), or a total of 15 vehicles. There was, however, no contractual provision requiring that a satellite actually be placed into orbit. The principal subcontracts entered into by the Martin Co. were:

General Electric Co.: Development of the first-stage engine, October 1, 1955.

Aerojet-General Corp.: Development of the second-stage engine, November 14, 1955.

Grand Central Rocket Co.: Development of the third-stage motor, February 1956.

(A parallel program for development of a third-stage engine was entered into with the Allegany Ballistics Laboratory of the Department by the Navy directly in April 1956. This development has been continued independent of VANGUARD. However, it is planned to use this motor on the final VANGUARD in an effort to orbit a greater payload than would otherwise be possible.)

The VANGUARD was plagued with a number of difficulties from the very outset. Delivery and launch schedules developed in November 1955 (2 months after the prime contract had been awarded) were overly optimistic. They had to be revised in March 1956 (see table I, p. 26), after General Electric and Aerojet General Corp. had advised that more time than was reflected in the November 1955 schedule would be required to meet the specifications on weight and performance. There was also minor interference with the program caused by delay in determining the final specifications and in coordinating the work of the several subcontractors. In the late fall and winter of 1956 the project ran into serious development problems. The General Electric Co.'s first-stage engine performance was below specifications. The Aerojet General Corp.'s second-stage engine and tank fabrication difficulties required new approaches, and the third stage was overweight and required additional development to meet performance specifications. It was suspected that the structural design of the vehicle was inadequate to withstand the vibration loads. As a consequence, design and production were stopped completely for about 1 month until this problem was resolved.

It was obvious at this time that delivery of vehicles would be about 6 months behind the initially planned dates and the launching schedule was again revised in February 1957. (See table I, p. 26.)

By early spring of 1957 most of the serious problems which had developed appeared to have been solved or somewhat alleviated, but this had not yet been proven through actual flight testing. The second-stage engine appeared to be the most difficult problem. There was gradual erosion (not burn-through) of the aluminum combustion chamber which decreased the velocity increment available from the second stage. This problem was not solved until October 1957 and there was another revision of the launch schedule. At this time planned launching dates were running 8 to 9 months behind the original schedule. (See table I, p. 26.)

By October 4, 1957 (the date Sputnik I was launched into orbit), the VANGUARD program was 2 years old—that is 2 years had passed from the day the Navy was instructed to proceed with the development of a satellite launching vehicle. Development work was considered to be about 90 percent complete. Two preliminary test shots (TV–0 and TV–1) had been fired; however, the booster for both of these shots was the Viking rocket and neither of them had carried a second-stage engine. TV–2 was on the launch pad at Cape Canaveral preparatory to being launched as the first flight test of the newly developed GE engine. It was also to be the first flight test of the actual VANGUARD configuration, but with dummy second and third stages. Test vehicles 3 and 4 had not been delivered. They were still at the Martin plant at Baltimore and had not been accepted by the Navy. Manufacturing of the final test vehicle (TV–5) had been completed. The satellite launching vehicles were in various stages of the manufacturing cycle, but none of them had been completed.

A White House press release issued October 9, 1957, is quoted in part as follows:

4. In May of 1957, those charged with the U.S. satellite program determined that small satellite spheres would be launched as test vehicles during 1957 to check the rocketry, instrumentation, and ground stations and that the first fully

instrumented satellite vehicle would be launched in March of 1958. The first of these test vehicles is planned to be launched in December of this year.

* * * * * * *

I consider our country's satellite program well designed and properly scheduled to achieve the scientific purposes for which it was initiated. We are, therefore, carrying the program forward in keeping with our arrangements with the international scientific community.

These statements were taken as "commands" by those responsible for the program that the October 1957 launch schedule was to be adhered to and that there was to be no further slippage in the program. The Nation's news media appear to have ignored the fact that the statement speaks only of "launching satellite spheres"—it does not say the rockets will be successful in placing the "satellite spheres" into orbit.

Planned launching dates set forth on the October 1957 schedule were allowed to slip just 1 month as is shown in table I, page 26. TV–2 was launched October 23, 1957; TV–3 December 6, 1957; and TV–4 on February 5, 1958. Thereafter there was one launching each month through June 1958, when SLV–2 was launched. From December 6, 1957, to June 26, 1958, six vehicles having satellite capability were launched. Only one, TV–4, launched March 17, 1958, was successful in placing a satellite into orbit. Table II, page 27, gives some data concerning each of the shots fired, including a brief statement of the cause or causes of failure.

Following the failure of SLV–2 on June 26, 1958, the Director of the Advanced Research Projects Agency (ARPA), a unit of DOD which in May 1958 had been given responsibility for all satellite and other outer-space programs, ordered further launching attempts suspended. He instructed a technical group to look into "all aspects of the VANGUARD for the specific purpose of recommending the best future course for the project from the standpoint of the national prestige and of scientific accomplishment."

The principal conclusions of the group as set forth in its report dated July 18, 1958, are:

1. Overall design and operations are believed to be sound. All three engine systems have performed well, both separately and together.
2. There appear to be no major problem areas in operations or in overall management.
3. The costs involved in either completing or canceling the program are comparable.
4. Study of the failure history indicates that there is now about an even chance of getting one or two successful flights out of the remaining five VANGUARDS. (Staff comment: It is believed that the inability to determine the reliability with any degree of accuracy accounts for this indefinite conclusion. If the reliability is about 15 percent, the chances are about 50–50 of getting one orbit out of five tries; if the reliability is 30 to 35 percent the chances are about 50–50 of getting two out of five tries.)
5. There is no longer any requirement for completion of VANGUARD launchings prior to the end of 1958, and the launching schedule can be relaxed several months if reliability might thereby be improved.

During the course of its review the technical group interviewed Dr. R. W. Porter, Chairman of the Earth Satellite Panel of the U.S. National Committee for the IGY, on July 2, 1958. Dr. Porter informed them that the feeling in the scientific community with regard to accomplishment and prestige was that two successful flights from the then remaining five VANGUARD vehicles would provide very significant data and would regain a considerable portion of the Nation's prestige; that one successful flight would be worthwhile; and that it was extremely desirable to accomplish one or two successful VANGUARD flights before April 1, 1959.

Dr. Porter also advised at that time that the remaining scientific satellite packages intended for VANGUARD could be repackaged for use on other launching vehicles but that such a procedure would involve delay and extra cost.

Following submission of this report and in accordance with a recommendation made by the group, a captive flight test was made of the complete second stage. It performed well and on September 26, 1958, SLV–3 was launched. It missed placing a 20-pound satellite into orbit by the narrowest of margins.

On October 1, 1958, the President transferred responsibility for Project VANGUARD to the newly created National Aeronautics and Space Administration (NASA). The launching program was again suspended, and the Administrator of NASA appointed another group to study the VANGUARD and other satellite and lunar-probe launching vehicles. This group, as of February 15, 1959, had not submitted its report. However, staff representatives have interviewed the Assistant Administrator of NASA and the Chairman of the study group. It appears that the group will recommend no major changes in the VANGUARD program, and it is anticipated the remaining vehicles will be launched on the dates shown below:

SLV–4: February 17, 1959.
SLV–5: March 13, 1959.
SLV–6: April 10, 1959.
TV–4BU: June 2, 1959.

Some information on the estimated probabilities of placing one or more satellites into orbit with the four remaining VANGUARD launching vehicles is set forth in the section of this report devoted to reliability.

TABLE I.—*Comparison of significant VANGUARD schedules vehicle delivery and launch*

Vehicle No.	November 1955		February 1957		October 1957		January 1959		Actual	
	Deliver	Launch	Deliver	Launch	Deliver	Launch	Deliver	Launch	Deliver	Launch
TV-0 [1]	July 1, 1956	Sept. 27, 1956							Sept. 20, 1956	Dec. 8, 1956
TV-1	Oct. 1, 1956	Nov. 29, 1956		Apr. 25, 1957					Jan. 9, 1957	May 1, 1957
TV-2	Dec. 1, 1956	Jan. 31, 1957	May 3, 1957	June 26, 1957					June 14, 1957	Oct. 23, 1957
TV-2BU	Jan. 15, 1957	Backup	July 5, 1957	Sept. 6, 1957		Backup			Aug. 2, 1957	[2]
TV-3	Feb. 1, 1957	Mar. 29, 1957	Aug. 30, 1957	Oct. 15, 1957		Dec. 4, 1957			Oct. 9, 1957	Dec. 6, 1957
TV-3BU	Mar. 15, 1957	Backup	Sept. 27, 1957	Backup	Oct. 18, 1957	Jan. 9, 1958			Nov. 11, 1957	Feb. 5, 1958
TV-4	Apr. 1, 1957	May 30, 1957	Oct. 25, 1957	Dec. 6, 1957	Nov. 22, 1957	Feb. 12, 1958			Nov. 20, 1957	Mar. 17, 1958
TV-5	June 1, 1957	Aug. 1, 1957	Dec. 20, 1957	Feb. 14, 1958	Jan. 17, 1958	Mar. 19, 1958			Jan. 11, 1958	Apr. 28, 1958
SLV-1 [3]	Aug. 15, 1957	October 1957	Jan. 17, 1957	Mar. 21, 1958	Feb. 14, 1958	Apr. 23, 1958			Feb. 5, 1958	May 27, 1958
SLV-2	Oct. 15, 1957	December 1957.	Feb. 14, 1958	Apr. 25, 1958	Mar. 14, 1958	May 28, 1958			May 12, 1958	June 26, 1958
SLV-3	Dec. 15, 1957	February 1958.	Mar. 14, 1958	May 30, 1958	Apr. 11, 1958	July 2, 1958			June 13, 1958	Sept. 26, 1958
SLV-4	Feb. 15, 1958	April 1958	Apr. 11, 1958	July 3, 1958	May 9, 1958	Aug. 6, 1958		Feb. 17, 1959	Aug. 18, 1958	
SLV-5	Apr. 15, 1958	June 1958	May 9, 1958	Aug. 8, 1958	June 6, 1958	Sept. 10, 1958		Mar. 13, 1959	Jan. 21, 1959	
SLV-6	June 15, 1958	August 1958	June 6, 1958	Sept. 12, 1958	July 3, 1958	Oct. 15, 1958	Jan. 7, 1959	Apr. 10, 1959	Feb. 13, 1959	
TV-4BU [4]	May 15, 1957	Backup	Nov. 22, 1957	Backup	Dec. 20, 1957		Mar. 8, 1959	June 2, 1959		

[1] Test vehicle.
[2] Not scheduled—Cannibalized; parts salvaged and shell on display at Smithsonian Institution.
[3] Satellite launching vehicle.
[4] Not fired because of success with TV-4. Will be used as SLV with different third-stage engine in effort to orbit 50-pound instrumented satellite.

TABLE II.—*Actual launchings of VANGUARD test vehicles and satellite attempts*

(TV—Test Vehicle Series)

TV–0—December 8, 1956: Test of range facilities, telemetering, and range instrumentation by use of VIKING rocket No. 13. No VANGUARD components involved. *Successful.*

TV–1—May 1, 1957: Test of VANGUARD third stage for separation, spin-up, ignition, propulsion. Test of VANGUARD control system. VIKING No. 14 used as first stage. Extensive telemetering carried. Complete success. *No orbit capability.*

(Sputnik—October 4, 1957.)

TV–2—October 23, 1957: Test of new VANGUARD, first stage, VANGUARD control system, vehicle structure. Second and third stages inactive. Complete success. *No orbit capability.*

TV–2—BU: Backup. Not needed because of TV–2 success. Has been cannibalized—shell on display at Smithsonian Institute.

TV–3—December 6, 1957: First test of complete vehicle, complete control system. (First flight test of second stage.) First stage failed, at lift off. Remainder had no opportunity to function. First vehicle to have *orbit capability. Failure.*

TV–3 Backup: February 5, 1958. Repeat of Test TV–3. This again represents first test of second stage and complete control system. First stage propulsion worked. Control system malfunction broke up rocket at 60 seconds. No test of second or third stage. (*Had orbit capability.*) *Failure.*

TV–4—March 17, 1958: Same objective as TV–3. First test of second stage. Defects discovered in previous tests corrected. Successfully put 3.25-pound test satellite into orbit. First stage above normal, second stage, a little below normal. Third stage normal. *Complete success.*

(NOTE.—This is within IGY.)

TV–4 Backup: Not used. Converted to launch vehicle for use later in program.

TV–5—April 28, 1958: Last of series of test vehicles. Complete system with regular IGY scientific satellite. (Had orbiting capability.) First and second stages worked. Control system sequence failed. Third stage not activated. *No orbit.*

(SLV—Satellite Launching Vehicle Series.)

SLV–1—May 27, 1958: Start of "Launching" Series. Faulty second stage burn-out threw rocket off course beyond capability of control system to correct. First and third stages and satellite functioned properly. Twenty-minute flight to 1,850 miles in space. *No orbit.*

SLV–2—June 28, 1958: Second stage cut off prematurely to terminate sequence. Low thrust due to clogged filters in oxidizer feed system. *No orbit.*

SLV–3—September 26, 1958: Second stage thrust too small because of clogged filter in fuel feed system. All remainder worked. Final velocity slightly too small (1 percent) to maintain orbit. *No orbit.*

Summary, Feb. 1, 1959

Planned test vehicles (TV's) in program	9
Planned satellite vehicles (SLV's) in program	6
Total vehicles in program	15
Test vehicles launched	7
Satellite vehicles launched	3
Total launched	10

Vehicle launching schedule, Feb. 1, 1959:

SLV–4 (Feb. 17).	
SLV–5 (Mar. 13).	
SLV–6 (Apr. 10).	
TV–4BU (June 2).	
To be launched	4
TV–2 Backup not scheduled for launching	1
Total	15

IV. PROS AND CONS OF PROJECT VANGUARD

In response to the request in the directive for information about the pros and cons of project VANGUARD, the Staff has attempted to digest in brief form the important accomplishments of the project (pros) and the important factors adversely affecting it (cons). In any project of considerable magnitude, it is not difficult on an ex post facto review to single out mistakes. This is particularly true of a development program like the VANGUARD where, because it is pushing the state of the art, there are no established signposts pointing the way. In an effort to be as objective as possible, the Staff has attempted to avoid reporting obvious but unavoidable or insignificant human errors, and has tried to report as "cons" only those actions and decisions which appeared to have had a major impact on the program.

A. "Pros"

As has been pointed out, the Staff study group is firmly convinced that the VANGUARD project is not a failure if the rulebook used in creating it is also used in passing judgment on it.

Two objectives were established for it:

1. To place an instrumented satellite in an orbit around the earth.
2. To prove that the satellite is in orbit and to furnish orbit information for scientific purposes.

The rulebook used in establishing VANGUARD said it could have 15 vehicles with which to accomplish objective No. 1 and that, if necessary, it could have until December 31, 1958, to prove it had done so.

On March 17, 1958, VANGUARD launched an instrumented satellite weighing 3.25 pounds into an orbit whose minimum perigee of 400 miles gives an estimated orbital life of 200 years. This satellite is much smaller than the one it was hoped would be launched into orbit by VANGUARD. There are, however, four vehicles remaining in the program and there is estimated to be a 50–50 chance that at least one of them will launch the 20-pound satellite into orbit.

The National Science Foundation furnished the staff a series of reports setting forth detailed information on the scientific data which have been obtained from the VANGUARD and other satellites. The Foundation also called attention to the fact that the overall scientific program developed for use with the VANGUARD launching system has made possible the total program of space vehicle scientific instrumentation, observation, and data reduction carried out under IGY auspices. Many other sources outside the DOD have given assurance that the information obtained through observation of the VANGUARD has been and will continue to be useful to the scientific community. The staff has made no attempt to analyze these data. However, it appears that the orbital data yielded by the VANGUARD have permitted the most accurate and significant determination of the earth's shape which has thus far been made. This determination has resulted in considerable revision of previously held views.

It is believed that accomplishments other than orbiting a satellite should be considered among the pros of the project. The most important segment of the entire complex is the launching vehicle. As will

appear later in this report, some $73.5 million out of a total program cost of $111 million has been or will be spent on the vehicles.

The VANGUARD vehicle is a three-stage rocket. The first stage is a fully developed, highly reliable system. The only time it has failed to work properly when called upon to do so was during its most publicized launching of December 6, 1957. It is the belief of those consulted, both inside and outside the DOD, that the VANGUARD'S first stage, because of its high efficiency and relatively low weight, may prove to be very useful as a second stage for the large boosters that will be available in the future. The third stage is also an efficient and highly reliable rocket. In the flights so far conducted it has performed successfully four times out of four opportunities to do so.

The possibility of future applications for this rocket are not known. However, it has been learned, that an alternate third stage, which will be used on TV–4 backup vehicle scheduled to be fired on June 2, 1959, is expected to give VANGUARD the capability of launching a 100-pound satellite, and this makes it appear that the present third stage may be obsolete. The second stage is a high-performance but less reliable engine. Whether all of its problems have been or ever will be solved remains to be proven. Significantly, however, the vice president of the Martin Co. in charge of VANGUARD Cape Canaveral operations advised the staff that he thinks many of the difficulties experienced with this engine have resulted from too much testing and too many adjustments after delivery by the manufacturer.

The VANGUARD development has been of value to ballistic missile programs and to the Air Force lunar probe shots. The VANGUARD second-stage engine was used as the second stage for the two THOR-ABEL reentry test shots which are reported to have traveled some 6,000 miles.

Aside from the vehicle itself, the VANGUARD complex includes ground launching facilities and a tracking system. It is claimed by those connected with the project that the telemetering equipment developed as part of the ground launching facilities and the worldwide Minitrack system for tracking the satellite are contributions of major merit.

The staff discussed the VANGUARD program with a number of informed people not connected with the DOD. All of them expressed the view that the VANGUARD development represented a considerable accomplishment when viewed in the light of the time available to it and the magnitude of the effort.

B. "Cons"

Many important people, including prominent scientists, feel that the greatest single factor adversely affecting the U.S. efforts to launch a suitable earth satellite during the IGY was the decision to develop the launching vehicle entirely independent of any military missile program. This decision, which was apparently made by the National Security Council, has been termed a "national tragedy" by some of those interviewed during the inquiry.

It appears to be quite clear in retrospect, and indeed seemed clear to some at the time, that a program coupled to a military missile development would provide earlier and more certain capability. Some scientists indicated that such an effort would contribute to missile capability rather than hinder it.

Another factor which may have adversely affected the chances of success, and which certainly adversely affected the public understanding of the project, was the vagueness of the goals. Although the stated objective was to place a satellite in orbit, there was no clear statement as to the probability of success to be expected from the small number of attempts scheduled. However, the present recollection of the program managers is that the informally accepted goal was to develop a capability that would yield about a 50–50 chance of getting one satellite into orbit in six attempts. The information released to the public by national leaders did not make this point clear. The program as established was not compatible with a goal of near certainty of success, but was more nearly compatible with a 50–50 chance.

The fact that these probabilities were never brought home to the public has certainly influenced public evaluation of the project strongly and unfavorably. This accounts in a measure for the fact that a project which is almost a success in terms of standards set for it has been adjudged a failure before it has run its allotted course.

Following the selection of VANGUARD, other factors emerged which probably affected the program and its chances of success adversely to some extent.

Both the complexity of the task and its cost were underestimated, resulting in overly optimistic time schedules. The underestimated cost, coupled with the fact the decision to proceed with the satellite was made in July 1955, a date not compatible with DOD appropriation submissions, resulted in a decision to finance the project from funds otherwise available. The funds were apportioned on a hand-to-mouth basis, which arrangement interfered with long-range plans and programs as there was always doubt whether sufficient funds would be made available. Appendix A, page 61, gives some details regarding the funding arrangements.

The requirement of noninterference with military programs, the austere initial budget, the rigid time limit imposed by IGY, the absence of a suitable priority (until sputnik), resulted in management attitudes and decisions which curtailed reliability efforts and programs to a level below that characteristic of the complex missile programs. In particular, they prevented the establishment of multiple launching facilities and a greater testing program which could have provided more assurance of success.

One of the factors influencing the selection of the Navy proposal was that the Martin Co., proposed as prime contractor, had available a design group that had 9 years' previous experience with the VIKING rocket. One week after the VANGUARD contract was signed, the Martin Co. was awarded the contract for the development of the TITAN, an intercontinental ballistic missile having the highest national priority. Martin divided the VIKING team, with several of the more experienced engineers going to TITAN. Although denied by the Martin Co., it seems almost certain that this maneuver deprived the VANGUARD project of talents which might have expedited its development and possibly made it a more reliable vehicle.

Some informed persons have advised that in general there was an absence of an attitude of interest, enthusiasm, or urgent concern regarding VANGUARD in the highest echelons of DOD. It was reported that some top-level people, including the then Secretary of

Defense, expressed the view they did not care what is on the other side of the moon or why the grass is green. It was pointed out that while the attitude reflected by these expressions did not find its way into official directives, the scientists and other people associated with VANGUARD felt that they represented an official view that VANGUARD had little value or interest except to the scientific world.

Organization difficulties interfered with the smooth operation of some facets of the program. There was divided responsibility in the Navy Department and failure, especially in the early stages of the program, to define properly the duties and authority of organization units and personnel. The Martin Co. found it difficult to get timely decisions at Cape Canaveral since there was, at least in the early part of the program, no single source of final authority. The Martin Co. also had internal organizational problems. It did not establish an appropriate quality control group at Cape Canaveral until 1958 and did not recognize the necessity for coordinating the work of the principal subcontractors into a team effort. The program management concept, at least until the latter stages of the program, seems to have been: "Martin is the prime; Aerojet General, General Electric, and others are just subcontractors, responsible only for delivering a product which meets the specifications; and there is no reason to treat them as associate contractors in the production and launching of the complete vehicle." It is the opinion of some people, particularly those consulted at Cape Canaveral, that good "team" effort early in the program might have reduced some of the launching delays and made it possible to expedite the test program.

During the course of its review the staff observed that a general air of looseness and informality seemed to have prevailed in this program. Difficulty was experienced in locating documentation for views that were fairly generally held by those associated with the project. The lack of formalization of the goal of the program insofar as it relates to the chances of success has already been commented on. There was no documentation to support the assertion now generally made that it was "understood" that the project would not be acceptable if planned as anything other than a low-budget effort. The staff found it impossible to obtain documentation on instructions given the program managers and the prime contractor following Sputnik I. It was generally stated that they were told to "Get a satellite into orbit without further delay."

It appears that the looseness, lack of formalization, and early management problems may have resulted from the fact that VANGUARD grew out of the VIKING program. VIKING management concept and procedures were geared to a program involving the production of two vehicles a year and little more than $1 million in annual costs. The rockets were handmade and in essence were produced, modified, and launched by the men who designed them. The Naval Research personnel connected with this program had close personal contact with these people and there was little need for formalization of plans, objectives, and procedures.

The short time scale allocated for VANGUARD, the complex design, and the necessity for producing a relatively large number of vehicles in a short time made it necessary to carry on many facets of the program simultaneously and to adopt production-line techniques requiring a concept of management quite different from that of the VIKING effort.

Publicity officially released, following Sputnik I, caused a crash program to be undertaken. Work at Cape Canaveral was put on a three-shift basis. This action, according to those closely associated with the program, was poor procedure. The groups working on different shifts tended to work independently and strict control over the operations being performed became impossible.

In the general hysteria which prevailed, work which should have been done in the hangar was left undone; and because of poor communication and lack of continuity of working forces, people working on the launch pad assumed the required operations had been performed in the hangar. This situation contributed to the adjustments which had to be made during "checkout" procedures just prior to the launch attempt.

It should be noted that none of the people interviewed claimed that any vehicle was launched before it was thought to be ready. Some of them, however, felt that their judgment as to "readiness" was no doubt influenced by the pressure on the program to "get a satellite into orbit" so as to meet the expectations of the public.

Although prime responsibility for the Department of Defense VANGUARD effort has always been centered in the Naval Research Laboratory, review and coordinating responsibility was shifted a number of times. Initially the Assistant Secretary of Defense for Research and Development had review responsibility; in May 1957 the project was placed under the Special Assistant for Guided Missiles (SAGM); in May 1958 it was transferred to ARPA; and in October 1958 all responsibility, including that previously assigned to the Navy, was transferred to NASA. It is not possible to demonstrate that the shift from the ASD (R. & D.) to SAGM delayed the program. In the case of the other two transfers of authority, specific launching delays occurred, as has already been discussed in this report.

During the course of the inquiry a number of allegations concerning mismanagement, incompetence, failure to meet specifications, and friction came to the attention of the staff. Some of these statements had been made publicly, some in hearings before congressional groups, and some were made directly to the staff. Effort has been made to determine the facts in each case where the allegations were such as to permit specific inquiry. It is worth noting that many of the allegations were made by people having no facts but who were, nevertheless, quite willing to condemn the program solely on the basis of results of the launching efforts to date. The staff believes, on the basis of its study of VANGAURD and recent study of other missile programs, that the "cons" in the VANGUARD project are not significantly greater than those in other comparable efforts.

V. ASPECTS OF RELIABILITY IN VANGUARD PROGRAM

There are two important uncertainties associated with any new undertaking, such as this satellite attempt, which goes beyond the existing proven equipment into new areas of development. The first, which may be called the design uncertainty, is concerned with the question, "Does the system as proposed actually have the capability of achieving the objective?" The success of TV–4 and near success of SLV–3 remove this uncertainty.

The second, or reliability uncertainty, is concerned with the question, "Can all of the parts and components that are needed be manu-

factured, assembled, tested, and operated by the people involved in a sufficiently reliable manner to insure the required chance of attaining the objective?"

It is self-evident that the reliability that must be achieved and the effort that must be expended to attain it will depend upon the goals established. Thus it becomes important to ascertain, if possible, what chance of attaining the objectives was established as the goal at the outset of the VANGUARD program.

The brief table which follows shows the reliability required to insure the indicated chance for achieving the objective. Reliability is the probability of success (orbit) in any one attempt (equivalent to the fraction of success to be expected in a large number of attempts with identical items).

TABLE III

If the objective is at least one satellite in orbit out of six launching attempts:

[Percent]

Chance of success	Chance of failure	Reliability required
95	5	40
90	10	33
50	50	15

If the objective is at least two satellites in orbit out of six launching attempts:

[Percent]

Chance of success	Chance of failure	Reliability required
95	5	57
90	10	50
50	50	25

Experience available at the beginning of the VANGUARD program indicated that reliabilities of 40–50 percent for a three-stage system would require long expensive programs with extensive attention to reliability. However, officials in the program believed that a reliability of 15 percent could be achieved within the time and funds available.

A. Reliability goals

In attempting to find information regarding the original goals set for the reliability of the VANGUARD vehicles, who set them, and on what basis, the staff has reviewed the documentary record and has talked to officials in the IGY, OSD, Navy, and the prime contractor, the Martin Co. The pertinent clauses in the Navy-Martin contract are as follows:

DESIGN SPECIFICATION FOR VANGUARD LAUNCHING VEHICLE

1.0 INTRODUCTION

1.1 *Scope.*—This specification with its appendixes and references defines the requirements of the Naval Research Laboratory for the design, manufacture, testing, and preparation for launching of VANGUARD launching vehicles and test vehicles.

1.2 *Objective.*—The objective of Project VANGUARD is to establish a satellite in a predetermined orbit around the earth. The satellite will be built by the Government and placed in its orbit by the VANGUARD launching vehicle.

* * * * * * *

1.5 *General procedures.*—The Government will exercise such direction and controls as are necessary to assure itself that launching and test vehicles meet their objectives both in performance and reliability. The Government will determine the performance and *degree of reliability* that can be reasonably expected within the time-scale framework. [Italic supplied.]

As is evident from the very general tone of these clauses, no numerical estimates or requirements of reliability were specified. The staff has not been able to establish that the Government (NRL) ever formally determined the "degree of reliability that could be reasonably expected within the time-scale framework" (1.5 above) or set any definite reliability goals for the contractor.

The Director of Project VANGUARD (Dr. Hagen) stated that the original proposal envisaged a reliability that would give a "reasonable" chance of putting one satellite in orbit in six tries, but that the project was conducted with the aim of doing everything possible under the circumstances to improve this probability. Dr. Hagen defined the term "reasonable chance" as having meant to him approximately a 50–50 chance, i.e., 50 percent probability. (The corresponding goal for reliability would have been approximately 15 percent as shown in table III.)

Officials of the Martin Co., Baltimore division (Vice President Varrier and Project Engineer Markarian), did not commit themselves to any numerical statement as to the reliability goal which they set for themselves. They merely emphasized that they were "confident" that they could get at least one satellite of planned size in orbit.

The minutes of the first meeting (October 20, 1955) of the Satellite Panel of the U.S. National Committee (USNC) contain this statement:

> It appears that at the present time the objectives of the Project VANGUARD are to put one satellite into orbit, with six vehicles scheduled to try this.

Officials of USNC state that they have no knowledge that any more definite estimate of the probability of launching success was ever made by DOD.

The Stewart committee used the terms "reasonable assurance" and "reasonable chance" in describing their expectations.

Since none of the officials in this program clearly and formally stated or defined their goal (and may have had different ideas among themselves as to what it was), the confusion and unwarranted expectation of success on the part of the public is understandable, particularly since the project name—VANGUARD—itself implied a goal, or a promise, of a successful "first" satellite.

B. Limiting factors affecting reliability

In any development program, reliability is affected by coordinations or compromises involving time, money, weight, parallel approaches, and competition with other projects. Managerial judgment must strike the balance.

At the outset, the final deadline for attaining the VANGUARD program mission (a satellite in orbit during IGY) was fixed as December 31, 1958. To design, procure, test, improve components for, and assemble and prepare a series of vehicles for launching requires a certain amount of time. The larger the number of vehicles to be

procured and launched, the greater the time required, unless a dual test program is arranged; and even then both lines may have to be stopped for fixing defects uncovered by either line. Thus, the single rigid limitation of available time put a limit upon the number of TV's and SLV's which could be usefully scheduled. A completely independent backup program would have been an alternative. This suggestion for backup came up repeatedly throughout the program but was undertaken only after sputnik. The record is clear that although the Stewart committee recommended establishment of a backup program, the DOD decided against it; relying on the Army capability to be used on a crash basis if needed. It is of interest to note that ONR requested an additional launching pad and six additional SLV vehicles. The request was not approved. The USNC for the IGY, through NSF, suggested to DOD that six more SLV's be scheduled (January–February 1956). The request was not approved. Obviously with more TV's or more SLV's or an additional backup program, the chance of achieving more orbiting satellites would have been increased.

Limitation of funds is a factor which obviously can affect reliability greatly but it does not appear to have been a critical element, excepting as it established the general size and scope of the program. All funds requested for VANGUARD were eventually made available. There were times, however, when the precarious funding situation approached the brink of cessation of activity.

The uncertainty and difficulty of the financing and the relatively low priority established for the program could have tended to inhibit requests for additional funds in support of greater reliability efforts. The technical leaders interviewed indicated they saw no tangible evidence that this was so or that the precarious funding actually retarded the effort.

In the technical design of a rocket to carry a given payload, a judgment must be made as to the size, to achieve the best balance between (*a*) cost, which in general increases with size, (*b*) reliability of components, which in general will be better if the rocket is large enough to permit extra weight for more reliable components, and (*c*) reliability of the propulsion system, which is likely to be uncertain if the size is scaled-up too radically beyond the state of the art.

After the basic VANGUARD size and design were accepted, the decision was made to design for lightweight. The contract with the Martin Co. provides:

> 3.1.2.4 (Requirements, general, structural design, design criteria):
> (a) *Weight considerations.*—Because of the penalty that weight imposes on performance, every effort shall be made to reduce the weight of the vehicle.

If the available thrust of all motors met the specifications, any saving in weight below the design limit would result in a more-than-minimum orbit. Conversely, if the thrust were below the specifications, an orbit might still be achieved if the total weight were below the design limit. It is understandable that the contractor responsible for the detailed design would consider it better to have a rocket of ample thrust/weight ratio at the sacrifice of some reliability than to attempt to achieve high component reliability at the cost of increased weight, which might result in loss of orbiting capability. On the other hand, those who felt responsible for the reliability and had confidence

in the performance of the motors could argue strongly for using some of the weight margin to attain greater component reliability. Typically this is the type of decision that must be a managerial one. In VANGUARD, the question of high reliability versus thrust/weight was generally resolved in favor of keeping the margin of safety in the thrust/weight ratio.

C. Reliability efforts

Clauses in the Navy-Martin contract read as follows:

3.1.3.6 (Requirements, general, construction): *Simplicity.*—Simplicity of satellite-launching vehicle construction shall be emphasized in the interest of providing reliability and decreased weight. Every effort shall be made to keep the number and complexity of components in the launching vehicle to a minimum. Application of this principle must not jeopardize attaining the mission of the vehicle.

* * *

3.1.10 (Requirements, general): *Reliability.*—The vehicle shall be designed and components selected on the basis of *available* reliability data to insure reliability consistent with the state of the art. Reliability studies and statistical testing *to establish such data shall not be required.* [Italic supplied.]

It is confirmed by both Navy and Martin officials that Martin felt that it would not be feasible, because of the limitations on cost and time, to mount a strong program of life testing to determine reliability of components. It is not clear why the Martin Co. officials seemed to feel that these limitations also precluded a coordinated "reliability program" of design review, test analysis, and reporting of unsatisfactory procedures, workmanship, or equipment.

As previously noted, Martin Co. reliability efforts may have been compartible with achieving a reliability of around 15 percent but certain aspects of the reliability effort, such as the reporting function, appear to have been deficient in the early stages of the program and were not compatible with achieving a high level of reliability.

On procurement of most items, Martin required qualification or performance tests to appraise the performance specified by the designer, but their design philosophy was characterized by some naval officers as being one of "adequacy is good enough."

Because of the large number of items requiring correction, as reported by the VANGUARD Operations Group (VOG) at the launching site, NRL requested Martin, in July 1957, to establish a quality assurance program in the field, and this was eventually done about the end of that year. The VOG then discontinued its reporting, depending on the Martin quality assurance reporting system. Although the number of items to be corrected decreased considerably after the Martin quality group was established, the VOG resumed its own series of reports on deficiencies after a few months.

The Martin Cocoa Division has begun returning defective equipment to the home plant for correction. This appears to represent a desirable change in procedure, since it will tend to force Martin, Baltimore, to maintain higher standards of workmanship. However, activities of the quality assurance group at the launching site are limited primarily to detection of errors in workmanship and performance, and design deficiencies are not likely to be detected in advance of testing by a quality assurance group in the field.

The first-stage motor had been given a thorough series of qualification tests, being required to operate successively for six successive

runs having a total running time of 1,000 seconds. The second-stage motor was apparently procured under much less stringent qualification testing, and the controls may not have had completely adequate system tests.

The above examples of reliability efforts, or lack thereof, are some of those that the staff has noted, but in the context of the uncertain (but low) reliability goal for the project, it cannot fairly be concluded that they indicate unreasonable executive judgment or that the program has not been reasonably well managed.

D. Analysis of flight results

Table II, page 27, gives the historical sequence of launch attempts and indicates in each case the most probable cause of failure as provided to the Staff by DOD from official flight analysis records. From the reliability standpoint, it is instructive to examine these defects in somewhat more detail to determine if possible whether they are due to (*a*) design deficiencies, (*b*) unreliability of parts, (*c*) faulty procedures (in manufacturing, assembly, or testing, or preparing for launch).

The destruction of TV–3 was attributed to an inlet pressure too low for the fuel pump. This pressure was, however, stated to be within specifications set for the pump. Thus, without more information the malfunction might be charged either to a defective pump (part) or to faulty procedure (procedure) if the difficulty might have been detected in prelaunch checking.

The breakup of TV–3–BU was due to a part failure in the control system (part) or to faulty inspection or installation of wiring (procedure).

The nonignition in TV–5 was attributed either to a relay failure (part) or to mismatch of design tolerances on the relay specifications (design).

The sudden change in attitude at second stage shutdown in SLV–1, was attributed either to faulty thrust pressure switch (part) or to inadequate design of shutdown equipment (design). The design was improved in later SLV's.

The faulty performance of the second stage in SLV–2 was attributed to inadequate removal of scale from the oxidizer tank (procedure).

The low thrust of the second stage in SLV–3 was attributed to contaminants introduced into fuel at fuel-up (procedure).

In the seven test flights (four in test vehicles, three in launching vehicles), one placed a satellite in orbit. Of six malfunctions, two were chargeable to procedures, two chargeable either to design deficiency or to part failure, and two either to procedures or part failure.

Although there is too little information for firm conclusions, it appears that the failures are due neither to chronic failure of any particular part nor generally to poor quality or reliability of parts. Those failures due to design deficiencies might possibly have been prevented by tighter design review. Redesign already completed should prevent their recurrence. Recurrence of procedural difficulties can be removed by improved procedures. However, it does appear that more attention to the preventive aspects of reliability, in addition to that given to the corrective aspects of reliability, would have improved the chances of success. It may, of course, be argued that the tight time scale, low budget, and limited test facilities would not have permitted any extensive increase in the preventive aspects of the reliability efforts.

Three other important items of information emerge from a review of the flight results:

(*a*) The success of TV–4 and near success of SLV–3 show that the system has the expected capability. No fundamental roadblocks to success exist.

(*b*) The initial estimates of 1 chance in 6 to get a satellite into orbit were not greatly in error and were probably conservative. (Actual score: one in seven and almost two in seven using four test vehicles and three SLV's.)

(*c*) The sequence of launching attempts on February 5, 1958, March 17, 1958, April 28, 1958, May 27, 1958, and June 28, 1958 shows that the team launching had achieved a capability of launching about one per month. They could presumably have launched three more after the September 26, 1958, attempt and within the IGY if they had not been stopped for program review. Thus the overall schedule did not turn out to be markedly unrealistic, in spite of slippages early in the program.

E. Prospects of success from remaining four vehicles

Although the predictions of the development and operating teams, based on their own experience and judgment, may furnish the best basis for estimating the probability of success in future launchings, it is possible to derive some rough estimates from an analysis of the success-failure records. It must be stressed in connection with any such estimates, however, that the quality of the system tends to improve after each shot. A shot is not a complete failure because orbit is not achieved. Each shot gives information about difficulties which can be corrected to improve the chances on later attempts.

Based upon the information given in table II, the following score chart (table IV) can be constructed. In this table a plus sign indicates that the indicated component had a chance to operate and did so successfully, a minus sign indicates opportunity followed by failure, and O indicates no opportunity. The score is the fraction obtained by dividing the successes achieved (numerator) by the opportunities (denominator).

TABLE IV

	1st stage	2d stage	3d stage	Guidance and control
TV-1	O	O	+	+
TV-2	+	O	O	+
TV-3	−	O	O	O
TV-3-BU	+	O	O	−
TV-4	+	+	+	+
TV-5	+	+	O	−
SLV-1 [1]	+	+	+	−
SLV-2	+	−	O	+
SLV-3	+	−	+	+
Score	7/8	3/6	4/4	5/8

[1] Difficult to say whether faults are chargeable to second stage or control system.

A rough estimate of the "average" reliability of the launching vehicle is the product of the success ratios of the four major components:

$$R = 7/8 \times 3/6 \times 4/4 \times 5/8 = \frac{0.21}{64} = 0.33$$

From appropriate statistical tables, this is found to indicate that there is an 80 percent chance of putting at least one of the next four shots into orbit and a 40 percent chance of putting at least two into orbit. But because of the small numbers involved, the rules of statistics say one cannot place much confidence in the statement. Assuming a 50 percent confidence, one can conclude only that the reliability is greater than 0.05 and that there is better than an 18 percent chance of putting at least one satellite in orbit. This is a very conservative estimate becaues it does not properly allow for improvements made, and is based on such small numbers. Also, the reliability might be increased by improvements yet to be made, perhaps even as a result of another failure.

Perhaps a better estimate of the reliability of the remaining vehicles can be obtained by getting engineering estimates from the various technical people involved. This has been done, and the estimates range from 20 to 40 percent reliability from those who will give numbers; and from "a good chance to get one" to "quite likely to get two or three" from those who are unwilling to make numerical estimates.

Putting all this information together, it seems safe to conclude that there is probably a 50–50 chance of getting at least one more satellite in orbit. In other words, the chance of placing an additional scientific satellite in orbit is as good now as the estimates of success made at the outset of the program.

Appendix A

BUDGET DATA

The review of the existing records and interviews with the program managers and the prime contractors produced convincing evidence that VANGUARD was conceived as a limited project involving expenditures of some $20 million to $30 million. According to data furnished by DOD, a total of $111,085,000 had been expended or programed for expenditure as of January 1959. A number of factors account for the increase, but the largest single factor is that realistic estimates of the total program cost were not made initially What has been loosely referred to as costs appear to have been limited to an estimate of the cost associated with the launching vehicles. The Martin Co.'s contract, which covers the development, fabrication, and the launching of the rockets, initially provided for costs of some $29 million. Martin Co. officials advised on January 8, 1959, that they had already expended some $53 million and they estimate their contract will involve about $59 million. This difference of $30 million is roughly divided into $15 million for change orders and an overrun of $15 million on originally estimated costs, or about 50 percent overrun.

The Martin Co.'s contract, which accounts for about 50 percent of the cost of the project, does not include all the costs associated with the launching vehicle and does not include any of the costs incident to optical and radio tracking, the satellite and its instrumentation, or data processing. A summary of the cost by program items and spending agency is presented below.

	Amount
A. Non-Navy-administered costs:	
1. National Science Foundation (NAS): Optical tracking, program administration, scientific experiment support	$5, 236, 000
2. U.S. Air Force:	
Range construction and support	3, 661, 000
Range use charge for launchings	4, 227, 000
3. U.S. Army: Prime construction tracking station	750, 000
Subtotal	13, 874, 000
B. Navy-administered costs:	
1. Radio Tracking:	
Construction, equipment, maintenance, operations, communications, satellite transmitters; data recording and transmission on all U.S. satellites	14, 551, 000
Tracking and recording data from Soviet satellite	1, 085, 000
2. Vehicles: Development, procurement, testing, telemetering, flight operations	73, 470, 000
3. Theory, data processing analysis: Reduction, publication of orbital and other information	5, 037, 000
4. Satellites and their instrumentation: Testing, flight, telemetering of data, data recording, reduction, and publication	3, 068, 000
Subtotal	97, 211, 000
Total	111, 085, 000

The funding pattern for VANGUARD has been unique. At the time the Navy was given instructions to proceed with the contract, September 1955, it was told to finance the program from any funds available, with the understanding that reimbursement would be made as soon as funds could be made available from other sources. Specific appropriations for the project have not been made to the Department of Defense. Consequently, each request for funds made by the program managers has caused some concern, and in some instances there has been considerable delay between the time the funds were initially requested and the date they were finally available for obligation.

The sources of the funds expended or planned for expenditure in connection with the VANGUARD are shown below:

DOD emergency funds, fiscal years 1956, 1957, 1958	$47, 385, 000
DOD authority to transfer from any available appropriated funds, fiscal year 1958	34, 200, 000
National Science Foundation and National Academy of Sciences	18, 362, 000
Funds from classified source	2, 500, 000
Costs absorbed by Air Force and Army from regular appropriations	8, 638, 000
Total	111, 085, 000

The tabulation below shows the dates on which funds were requested by NRL and the dates on which they were received.

Date funds requested by NRL	Funds received	
	Date	Amount
Sept. 30, 1955	Dec. 21, 1955	$15, 500, 000
	Dec. 29, 1955	2, 500, 000
Mar. 15, 1956	June 20, 1956	5, 800, 000
	Oct. 3, 1956	15, 000, 000
	Oct. 5, 1956	5, 500, 000
Nov. 14, 1956	Feb. 15, 1957	10, 000, 000
	Mar. 25, 1957	1, 826, 000
Mar. 15, 1957	June —, 1957	5, 800, 000
Apr. 23, 1957	Oct. 10, 1957	7, 000, 000
Oct. 30, 1957	Dec. 11, 1957	4, 400, 000
	Jan. 28, 1958	22, 800, 000
	do	1, 085, 000
Total NRL-administered costs		97, 211, 000

From the information obtained by the staff it has not been possible to determine the extent to which the unavailability of funds may have interfered with the expeditious prosecution of the program. Representatives of the prime contractor advised that the low-level concept of the program would have prevented the establishment of backup programs and of any elaborate reliability effort. However, they said that they could not point to the unavailability of funds as having influenced the prosecution of the program as it was conceived. The program managers, on the other hand, said that failure to recognize the magnitude of funds which would be required, and to make appropriate provisions for them, interfered with long-range planning, increased the amount of administrative work, and caused uncertainties on their part and on the part of the contractors. Several persons mentioned that the piecemeal manner in which funds were made available kept the project on a hand-to-mouth existence most of the time.

Appendix B

U.S. satellite efforts, 1958

	Launched	Remarks
EXPLORER I	Jan. 31	In orbit as of Feb. 15, 1959.
EXPLORER II	Mar. 5	Orbit not achieved.
VANGUARD I	Mar. 17	200-year orbit.
EXPLORER III	Mar. 26	In orbit until June 17, 1958.
VANGUARD	Apr. 28	Orbit not achieved.
Do	May 28	Do.
EXPLORER IV	July 26	6-year orbit.
EXPLORER V	Aug. 24	Launch attempt failed.
VANGUARD	Sept. 26	Orbit not achieved.
PIONEER I	Oct. 11	Effort to orbit moon failed.
EXPLORER VI	Oct. 23	Failed to launch.
PIONEER II	Nov. 8	Orbit not achieved.
PIONEER III	Dec. 6	Moon shot failed.
SCORE (ARPA project using ATLAS booster)	Dec. 18	In orbit until Jan. 21, 1959.

Summary

Orbits achieved	5
In orbit Jan. 31, 1959	3

Appendix C

ADVISORY GROUP ON SPECIAL CAPABILITIES

Buchheim, Robert W., electrical engineer (B.E.; M.S.; Ph. D.; Yale, 1953). Experience includes servomechanisms, autonavigator computers, missile guidance and control systems, analysis and design of satellites and space vehicles. Research engineer, the Rand Corp. (Joined group January 1957.)

Clement, George H.,[1] mechanical engineer (University of California, 1941). Assistant to president Rand Corp., Santa Monica, Calif. Experience includes analysis and design of large missiles, satellites, and space vehicles; tool, stress, and structure design and analysis, Douglas Aircraft Co.

Furnas, C. C.,[1] chemical engineer (Ph. D., Michigan, 1926). Experience includes director of research, Curtiss-Wright, 1942–46; director, Cornell Aeronautics Laboratory, 1946–54; chancellor, Buffalo University, 1954–; ASD (R. & D.), 1955–; chairman, Committee on Guided Missiles, RDB, 1951–53; technical advisor, panel on aeronautics, ASD (R. & D.), 1953–55; member advisory group on special capabilities, 1955 (resigned December 1955 to become ASD (R. & D.)).

Kaplan, Joseph,[1] physicist (Ph. D., Johns Hopkins, 1927). Member National Academy of Science. Presently Chairman, U.S. National Committee, International Geophysical Year 1957–58; professor physics, UCLA. Experience includes chairman, Department of Meteorology, UCLA, 1940–44; director Institute of Geophysics, UCLA, 1946–47. Noted for contributions to spectroscopy and composition of upper atmosphere.

Lauritsen, C. C.,[1] physicist (Ph. D., California Institute of Technology, 1929). Professor of physics since 1935. Experience includes membership on numerous science advisory committees, NDRC, DOD, USAF. Member, National Academy of Sciences. Noted for contribution to theories of electron emission, high-energy physics, nuclear physics. Member, Von Neumann Ballistics Missiles Science Advisory Committee.

McMath, Robert R., astronomer, engineer (B.C.E., Michigan 1913). Presently director, McMath-Hulbert Observatory, Pontiac, Mich. Chairman, board of directors, Motors Metal Manufacturing Co., Detroit. Experience includes OSRD, and advisor to DOD in aeronautics and guided missiles. (Resigned January 1958.)

Porter, R. W.,[1] electrical engineer (Ph. D., Yale, 1937). Presently engineer for General Electric Co. Experience includes RDB, USA, and GE Co. in fields of servomechanisms, aircraft armament, missile-guidance systems, rocketry and propulsion, radar. Past president, American Rocket Society; chairman, National Academy of Sciences Technical Panel on Earth Satellites.

Rosser, J. Barkley,[1] mathematician (Ph. D., Princeton, 1934). Professor of mathematics, Cornell. Experience includes rocket ballistics, numerical analysis, symbolic logic, digital computers. Consultant on rocket ballistics and computing machines to various Government agencies since 1943. Member, Von Neumann Ballistic Missiles Scientific Advisory Committee; past president, Association for Symbolic

[1] Member of the original group participating in selection of VANGUARD.

Logic; Fulbright and Guggenheim Fellow, University of Paris, 1953–54; director research, Institute for Numerical Analysis, NBS, 1949–50.

Smith, Paul A.,[1] secretary. Geodetic engineer (B.S.E., Michigan, 1924). Experience includes precise geodetic surveys and computations; navigation and cartography; technical, economic, and legal aspects of international civil aviation. Consultant to ASD (R. & E.).

Spriggs, James O., executive secretary since 1957. Physicist, lawyer. (Syracuse University, AS, 1936; L.L.B., 1940; A.B., physics, 1942). Member, New York State Bar. Experience includes research and design of direction finding and high-speed communications systems. Professional staff assistant to Director of Guided Missiles; executive secretary, Scientific Advisory Committee to Secretary of Defense; secretary, Antiballistic Missile Commission.

Stewart, Homer J., chairman. Aeronautical engineer (Ph. D., California Tech, 1940). Chief, Liquid Propulsion Systems Division, Jet Propulsion Laboratory, California Tech, and professor of aeronautics. Experience includes dynamic meteorology, fluid and supersonic flows, design and tests of rockets and guided missiles. Member, Scientific Advisory Board, USAF, 1949——; Guided Missiles Committee, RDS, 1948–52; OSRD, U.S. Weather Bureau, 1944; consultant to Aerojet Corp.

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CONTRACTS FOR SMALL BUSINESS

Mr. SIKES. You are constantly belabored about big business versus little business. I know it is the announced policy of this administration and of previous administrations to give as much assistance as possible in contract awards to small business.

Yet it appears from things that I read and things that I know that big business does continue to figure more and more prominently in our defense program.

Is there any real cure for this situation in view of the type of contract that the Defense Department must let with the new, big, sophisticated weapons systems?

Dr. YORK. Of course, not everything we do is in the big complicated weapons systems class. I do not know whether or not there is a cure.

I do know it is one of the items that we have been giving special attention.

In the particular case of my own office we worked with the Assistant Secretary of Defense, Supply and Logistics on this problem. There are directives out to the people who actually make contracts—and you understand in our office we do not make them since contracts are made by the services or by ARPA—giving them various advices and instructions with regard to paying special attention to this and doing what they can about it.

Also, of course, and I do not know how good our statistics are but we can probably supply you with something, there is not just a question of whether the prime contracts go, and when these are for billion dollar items it is not surprising they go to big business, but in each of these there are many, many subcontracts and sub-subcontracts which do filter down to small business.

The answer to the question is I do not know what the cure is. I do know it is something we keep attention focused on, and of course I speak only for research, development, test, and evaluation.

Mr. SIKES. May I hear from the other two witnesses?

Mr. HOLADAY. In this point it does get down to the subcontractor. I have been very much impressed, in following the activities of the small business people this year, to find the number of statements that are coming in about the large proportion of Defense business they are obtaining.

Some 3 or 4 months ago one fellow from the electronics industry was saying—"Why all of this crying about it? I haven't had any trouble getting business, and plenty of business in the way of defense."

Mr. FLOOD. Who is the prime contractor?

Mr. HOLADAY. I would have to look that up.

Mr. FLOOD. That is the answer.

Mr. HOLADAY. There is no quick answer. Certainly from endeavors and efforts that are going on by the prime contractors, and as you point out some are much better than others, and the small business effort within the Department of Defense, we seem to be making a lot of headway in getting this down to the small contractor, particularly in the subcontracting area.

Mr. SIKES. But mostly through subcontracts rather than through prime contracts?

Mr. HOLADAY. Yes. Prime contracts get so large. In the prime contracts we get five or six companies. You are almost a prime contractor when you get into MINUTEMAN.

Dr. YORK. Mr. Holaday speaks only in connection with missiles. In connection with many of these things we discussed earlier, those are small enough to go to small business, and they do.

Mr. SIKES. May Mr. Johnson comment on this same item?

Mr. SHEPPARD. Yes.

Mr. JOHNSON. We in ARPA have given this a good deal of thought and attention voluntarily and not only from the urging on the part of the small business committee. It is very apparent that what these two gentlemen have said is true—that the filter-down process is working very, very well.

I have personally talked to a number of small contractors and asked them their feelings and opinions in this matter. I think there is more of a prevailing thought that they cannot cope with prime contracts in most cases. They do not have the legal talent, the management talent, and everything else that is needed to administer any substantial contract in the prime sense.

Mr. SIKES. Have you noted a trend toward consolidation of activities by the prime contractors so that it is necessary in fewer instances to subcontract?

Mr. JOHNSON. This definitely trends the other way.

Mr. FLOOD. That is the answer to that one problem. Have you noticed on the other hand that while what you say is true, and becoming increasingly so, at the same time, following the path of least resistance, they are creating another evil which is that they are becoming captives of a line of established prime contractors? That is just as good one way as it is good the other.

Mr. JOHNSON. This is a hazard. You are right.

The systems concept does make necessary the perpetuation of certain large contractors over a long period of time, and then when that system becomes obsolete they may be seriously hurt in all their subs.

Mr. FLOOD. I am not so much concerned about the establishment of permanent primes in limited areas. I am concerned about establishing a chain of captive subcontractors, satellites of established primes, and shutting out an entire area of any other subcontractors.

Mr. JOHNSON. In many cases, sir, the prime contractors are recognizing the need of having more than one source for more and more of the components, subcontracting components.

I think there is a tendency now to split the work among a number of smaller contractors in certain cases.

Mr. FLOOD. I know.

Mr. JOHNSON. In the electronics industry I happen to be quite familiar with it, and in that case they are.

Mr. BOYLE. Of course, that lends itself to a wider dissemination. Take ATLAS, for instance. We have over 6,000 separate and distinct parts. You have a lot of room to bring in any number of subcontractors. Is that right?

Mr. JOHNSON. That is right, sir.

(Discussion held off the record.)

CHEMICAL AND BIOLOGICAL WARFARE

Mr. SIKES. Dr. York, I noted in your statement this terminology—

Programs in chemical, biological, and medical research

and in another place—

various CW and BW munitions development.

Dr. YORK. Yes, sir.

Mr. SIKES. I was quite pleased to see that. I think for too long there has been a disposition on the part of a good many people in the Department of Defense to overlook the capabilities of the people who are working in these particular departments and the contributions that they are in position to make toward a stronger defense.

Dr. YORK. Are you referring particularly to BW and CW, sir?

Mr. SIKES. Yes. Since this agency did not figure actively in World War II or in the Korean war, the great majority of high ranking military personnel simply have no direct knowledge of what those associated with this particular activity are capable of doing and what contributions they can make. I am very glad to see that you are studying their activities more closely. You do recognize the fact that they are in a position to make a contribution.

Dr. YORK. Actually, we are singling it out to a greater extent than you would realize from this particular document.

Mr. SIKES. That is all.

Mr. MAHON. Are there any further questions of these two gentlemen?

Mr. FLOOD. I would like to embrace what my friend Congressman Sikes has said. I had a note here to talk about B and C warfare, and I am glad you both have gone into that. Mr. Sikes and I have had that for a long time, and I am glad to see you are concerned about it.

Off the record.

(Off the record.)

PHYSICAL SCIENCE AND LIFE SCIENCE

Mr. FLOOD. Will you tell me what you mean on page 4 of your statement, the first line, under military science, a matter of definition: Physical science and life science. What are they and how do you distinguish them?

Dr. YORK. Life science refers to the investigation of living systems of any sort, whether it be plants, animals, and so on. Physical science, so to speak, is everything else. You can divide science into the two—life science and physical science. Life science concerns living organisms of any type, and physical science is what is left: Physics, chemistry, astronomy, geology, and so on.

SCIENTIFIC TERMINOLOGY

Mr. FLOOD. I am a lawyer, now please don't tell anybody but we have been baffling the public for a thousand years with legal Latin and our terminology, for which we exact substantial fees since laymen don't know what they mean, but we are being excelled by the scientific people recently.

Dr. YORK. We are doing our best, sir.

Mr. FLOOD. I know. You are doing well. What do you mean by the phrase "scientific disciplines" in the plural?

Dr. YORK. A scientific discipline is a single field of science. Physics is a scientific discipline. The plural just means a combination of more than one.

Mr. FLOOD. You use the word "discipline" interchangably with "fields of activity," is that it?

Dr. YORK. More or less, sir.

Mr. MAHON. Is that supported by Webster?

Dr. YORK. I do not know about Webster. It is general among the scientific and academic community. We have a pretty good "in" with Webster.

Mr. FLOOD. As a lawyer, it is straining at a gnat.

Mr. SHEPPARD. Webster does not have anything to do with it.

Mr. FLOOD. Poor Mr. Webster hasn't caught up to your profession at all. Why blame this man? He is pretty new.

(Off the record.)

ACCELERATION OF MINUTEMAN

Mr. FLOOD. Mr. Holaday, on page 3, the last sentence of your last paragraph on that page. I am startled by this language because what you are saying to us on this subcommittee is that "If you fellows have any idea of appropriating any additional funds to accelerate the MINUTEMAN program, either to buy time or more missiles or anything else, you had better be mighty sure that you don't degrade the characteristics of the missile, and in our opinion you had better not do it because that is what may happen," and so on. Is that what you are talking about?

Mr. HOLADAY. You can accelerate MINUTEMAN, without any doubt, by putting more money into it, and every time it has come up on considerations of this type we say, sure, we can bring the MINUTEMAN system out 6 months or 8 months in advance of this,

but it will only carry a ——— warhead or it will go only ——— miles. These are the kinds of things we are saying.

(Off the record.)

Mr. HOLADAY. We have several times approached the problem of accelerating MINUTEMAN, and we get a "yes" answer with the understanding that it probably will have a CEP that is ——— miles instead of the desired one, it may carry only a ——— pound warhead, or it may go only ——— miles. This is not reaching the MINUTEMAN objective.

However, I do not mean by this statement that we may not want more money. Personally, myself, I think it would be good if we had some more money in the kitty on MINUTEMAN, because in every missile system we have gone down to date, we have had to put more money in to solve some technical problem in order to stay on its original schedule.

So my feeling is that MINUTEMAN in all probability will need some more money in it in order to stay on schedule.

Mr. MAHON. You mean above the 1960 budget?

Mr. HOLADAY. Above the 1960 budget, but I think within the services we have probably a reprograming capability to do this if it is required.

Mr. FLOOD. I am concerned about that statement and doing what you want to do in that way, but General Irvine, after 2 days here on this whole show, finally wound up by telling me this. I said, "I want to buy 6 months' acceleration of MINUTEMAN. I want it 6 months earlier than you have it programed. How much is it going to cost us?" He said, "About $90 million." I said, "I want to buy it," but then he quit.

You tell me that is all right, but if I buy MINUTEMAN 6 months in advance of the way you have it programed, I am only going to buy half or three-quarters of a bird. Is that right?

Mr. HOLADAY. I will have to disagree with General Irvine. I usually do not disagree with him, but maybe we were talking about different things. It will take more than $90 million.

Mr. FLOOD. How much more, about, a round figure?

Mr. HOLADAY. $300 million.

Mr. FLOOD. In other words, General Irvine, who has been living with this thing long before you got here, tells me that it will cost $90 million to buy 6 months' advance on MINUTEMAN, and you come along the next day and tell me $300 million. That is quite a difference between you and Irvine. How could two bright boys in the same family get so far apart on such a red hot subject that we have been kicking around for a year? Don't you talk to each other?

Mr. HOLADAY. We sure do, and we are not so far apart.

Mr. FLOOD. You are not?

Mr. HOLADAY. No.

Mr. FLOOD. $90 million and $300 million.

Mr. HOLADAY. Let's get oriented as to what we are both saying.

Mr. FLOOD. Let's say what I said. You say that MINUTEMAN is going to be——

Mr. MAHON. You have asked him a good question. Let him answer.

Mr. FLOOD. I know, but I want to talk about what I want to talk about, not what he wants to talk about.

Mr. MAHON. Let him answer the question.

Mr. FLOOD. Go ahead. What do you think I asked you?

Mr. HOLADAY. What I think you asked was that General Irvine told you that with approximately $90 million extra there was possibly a chance of advancing it 6 months.

Mr. FLOOD. He didn't say possibly a chance. I said to him, "I want it 6 months in advance. How much will it cost?" He said, "$90 million." That was the end of the conversation.

Mr. HOLADAY. Maybe General Irvine knows more about it, but you do not usually buy technical accomplishments by expenditures of dollars alone.

Mr. FLOOD. I know that.

Mr. MAHON. Will you comment on the problem which has been raised here with these figures of $90 million and $300 million? Give your reaction to what has been asked. It is an interesting question.

Mr. HOLADAY. My point on the $300 million which I never got a chance to finish, over General Irvine's approach of $90 million trying to advance 6 months, his is what both the Air Force and ourselves agree is the cost of the extra effort to try to advance 6 months the availability of the first missile. My number of $300 million is including making missiles during this period, not only getting up to heaven 6 months earlier but making missiles, and I am talking about ——— missiles.

Mr. FLOOD. That is very clear. Now even if you do what you say, which will cost $300 million, I still am going to get only three-quarters of the bird if I accelerate, because I have degraded its characteristics. I am not going to get distance and I am not going to get warhead yield.

Mr. HOLADAY. I did not say that.

Mr. FLOOD. What did you say?

Mr. HOLADAY. I said there is the possibility of doing this, that we can get a bird earlier, but we cannot necessarily meet the objectives of the MINUTEMAN as it is now laid out. We always have that possibility.

Mr. FORD. May I ask a question there?

Mr. FLOOD. Sure.

Mr. FORD. If this money is made available, either $90 million or $300 million, assume it is $300 million, which offers us the possibility 6 months' earlier operational capability for the MINUTEMAN, what is the date we are talking about?

Mr. HOLADAY. You are talking about dates in the order of the end of ———.

Mr. FORD. The present schedule is the end of calendar ———?

Mr. HOLADAY. Yes, sir.

Mr. FORD. And this accelerated schedule would be the middle of calendar ———?

Mr. HOLADAY. That is correct.

Mr. MAHON. Would the $300 million be funds that eventually you will have to provide anyway, or would this be an extra cost that otherwise would never be incurred in the program?

Mr. HOLADAY. To answer the question, yes, with the $300 million we would have money to buy missiles with, which we would spend later anyhow. So as to trying to get back on a schedule of trying to advance with no guarantee, we are probably talking about something like $90 million or $100 million. I have very definitely in mind that we may want to try it, but I do not think we should ask the Air Force

necessarily to guarantee that they would deliver in the middle of

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Mr. FLOOD. Let me ask you one more thing. If I do what we are talking about and, regardless of whether it is $90 million or $300 million, buy a degraded MINUTEMAN, whatever that means, is that going to affect my MINUTEMAN from then on? Am I going to have a permanently degraded bird, or can you pick it up and put it back on the track for its full distance and full yield and remove the degraded qualities of the production bird later on? Am I going to degrade a whole generation of MINUTEMAN if I do this?

Mr. HOLADAY. No; I would not think so.

Dr. YORK. It is difficult to give a flat answer. It might delay the date at which you would get the full performance somewhat, but you would still be able eventually to get the full performance missile. It always endangers a program to do this.

Mr. FLOOD. That is all, Mr. Chairman.

Mr. MAHON. The point is, if I may interrupt here, you are not advocating and no one expects to undertake to produce this degraded missile. You are just using this as an argument against an unreasonable and infeasible program of expediting the MINUTEMAN. Is that approximately correct?

Mr. HOLADAY. That is correct. We are trying to make MINUTEMAN come out with a good system. I think the Air Force can do it along with the contractors they have.

Mr. SHEPPARD. Will the gentleman yield?

Mr. MAHON. Yes.

USE OF FUNDS PROVIDED BY CONGRESS IN EXCESS OF BUDGET

Mr. SHEPPARD. I would like to ask one question because of the general trend of talking about advancing these missiles. From your experience in the handling of your position, if this committee, in its wisdom or lack of wisdom, be it as it may, should add $300 million or $500 million or a billion dollars to the present missile program for the purpose of expediting it, do you have any assurance that you would spend a nickel of it?

Mr. HOLADAY. I haven't any assurance, because I do not have that authority.

Mr. SHEPPARD. Your past experience in expenditure fields where they have been escalated by Congress, only as recently as last year, is indicative of that fact, is it not?

Mr. HOLADAY. We spent some.

Mr. SHEPPARD. Yes, but you did not spend what the Congress gave you by a long way.

Mr. HOLADAY. Right.

Mr. SHEPPARD. Insofar as the budgetary procedure is concerned, I think it has been very clearly indicated by the Bureau of the Budget and by those who are supporting the budget that if the money is there, you are not going to spend it. Have you any different concept to that at the moment?

Mr. HOLADAY. I cannot, because I think that authority is at a much higher level than mine, and they do not pass it down to us to spend.

Mr. SHEPPARD. If you did not have some concern in that field, you would not be asking for the $150 million over here in emergency and extra authority, would you?

Mr. HOLADAY. That is right.

Mr. SHEPPARD. Why, certainly.

Mr. SIKES. May I ask a question here?

Mr. FORD. Surely.

ACCELERATION OF POLARIS

Mr. SIKES. The Navy testified to us that permission was requested to begin construction of three additional POLARIS submarines with 1960 money. Instead, they were allowed to budget for long leadtime items for three POLARIS submarines in the 1960 budget. What would have been your recommendation from the standpoint of the state of the art? Would you have recommended that they be given the money to begin construction of those submarines, or that the advanced, long leadtime money was all that should be given at this time?

Mr. HOLADAY. You are asking my own personal approach to this question?

Mr. SIKES. Yes.

Mr. HOLADAY. As to the state of the art, it would appear to me that more submarines could be used. That is my own personal opinion of this. You do have to realize, however, that in our overall studies we are matching POLARIS missiles with those coming from ATLAS, those coming from TITAN, and so on. You have a technical capability and competence to do things, and you have money on the other side, and which systems are moving the fastest. I think technically we could have put more submarines in the POLARIS missile system.

Mr. FORD. I have just one question of Dr. York.

ADEQUACY OF BUDGET REQUEST

Although you sought possibly to discredit yourself as a person fully familiar with the 1960 budget in R.D.T. & E. because of the fact that you came on the job relatively recently, would you feel competent to say to this committee, from your knowledge of the program as of now, that it is a satisfactory amount for R.D.T. & E. for fiscal 1960?

Dr. YORK. Yes, not just from my knowledge of the program, but from my acquaintance with the people who made the program up.

Mr. FLOOD. That is pretty good. That is what you call an escape hatch.

Dr. YORK. As time goes on, it becomes more and more the programs which I know myself. Obviously, that is where I started from, knowing the people who made it up.

By the way, I mean not just the people in the Office of the Secretary of Defense, but in all the services and in ARPA.

Insofar as there is a question, it is not so much with the amount as it is with what we do with that amount and details well inside of the program, not even necessarily questions between missiles and aircraft, but within aircraft, within missiles, within ordnance, matters of that sort. That is where the questions come.

I first come in a major way face to face with this when it comes time to look over the apportionment requests during the summer.

Mr. FORD. I for one, Dr. York, have complete and total faith in your views on these matters, despite your own hesitancy to say you are an expert on the fiscal 1960 amount. I think the record should show that you are not a neophyte in this area as far as the various programs and fundings are concerned, having been rather intimately connected with a number of our R. & D. programs over the last year or two.

Dr. YORK. Yes, although this is much broader than my previous acquaintanceship has been.

Mr. FORD. That is all, Mr. Chairman.

Mr. SHEPPARD. This committee will stand adjourned until 10 o'clock tomorrow morning.

WEDNESDAY, APRIL 15, 1959.

SALARIES AND EXPENSES, ADVANCED RESEARCH PROJECTS AGENCY

WITNESSES

ROY W. JOHNSON, DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY

LAWRENCE P. GISE, ASSISTANT DIRECTOR (ADMINISTRATION), ADVANCED RESEARCH PROJECTS AGENCY

COL. DENT L. LAY (USAF), ASSISTANT DIRECTOR, TECHNICAL OPERATIONS DIVISION, ADVANCED RESEARCH PROJECTS AGENCY

WILBUR W. BOLTON, JR., DIRECTOR, FINANCIAL MANAGEMENT AND REPORTS DIVISION, ADVANCED RESEARCH PROJECTS AGENCY

Program and financing

	1958 actual	1959 estimate	1960 estimate
Program by activities:			
1. Military sciences		$13,700,000	$18,000,000
3. Missiles and related equipment	$1,238,389	80,000,000	128,100,000
4. Military astronautics and related equipment	13,236,576	331,726,000	307,000,000
8. Programwide management and support	1,041,229	1,900,000	1,900,000
Total obligations	15,516,194	427,326,000	455,000,000
Financing:			
Unobligated balance brought forward		−67,583,806	−39,999,806
Unobligated balance carried forward	67,583,806	39,999,806	39,999,806
New obligational authority	83,100,000	399,742,000	455,000,000
New obligational authority:			
Appropriation		520,000,000	455,000,000
Transferred from:			
"Contingencies, Department of Defense" (72 Stat. 7)	10,000,000		
"Emergency Fund, Department of Defense" (71 Stat. 313; 72 Stat. 7)	73,100,000		
"Research, development, test, and evaluation, Air Force" (72 Stat. 712)		170,000	
"Aircraft, missiles and related procurement," Air Force (72 Stat. 712)		8,500,000	
Transferred to:			
"Construction, Advance Research Projects Agency, Department of Defense" (72 Stat. 1096)		−12,018,000	
"Procurement of equipment and missiles, Army" (72 Stat. 712)		−42,210,000	
"Research, development, test and evaluation, Army" (72 Stat. 712)		−15,500,000	
"Research and development, National Aeronautics and Space Administration" (72 Stat. 433)		−59,200,000	
Appropriation (adjusted)	83,100,000	399,742,000	455,000,00

Object classification

		1958 actual	1959 estimate	1960 estimate
	Total number of permanent positions	19	30	30
	Full-time equivalent of all other positions		1	1
	Average number of all employees	4	28	31
	Number of employees at end of year	20	31	31
	Average GS grade and salary	9.4 7,174	10.3 $8,588	10.3 $8,671
01	Personal services:			
	Permanent positions	$28,319	$252,600	$277,100
	Positions other than permanent	1,050	15,000	15,000
	Other personal services	817	2,600	2,600
	Total personal services	30,186	270,200	294,700
02	Travel	5,673	45,000	50,000
03	Transportation of things	5	500	500
04	Communication services	9	10,000	10,000
06	Printing and reproduction	465	3,000	3,000
07	Other contractual services	15,406,597	388,984,600	454,614,300
08	Supplies and materials	1,956	4,000	4,000
09	Equipment	69,436	8,300	3,400
10	Lands and structures		37,982,000	
11	Grants, subsidies and contributions	1,833	16,400	18,100
13	Refunds, awards and indemnities		1,500	1,500
15	Taxes and assessments	34	500	500
	Total obligations	15,516,194	427,326,000	455,000,000

Mr. SHEPPARD. We have before us this morning Mr. Roy W. Johnson, Director, Advanced Research Projects Agency.

JUSTIFICATION OF THE ESTIMATE

We will insert in the record at this point fiscal year 1960 ARPA budget estimate and general justification, and the sanitized statement which has been presented to the committee.

(The material referred to follows:)

APPROPRIATION LANGUAGE

SALARIES AND EXPENSES, ADVANCED RESEARCH PROJECTS AGENCY, *DEPARTMENT OF DEFENSE*

[SALARIES AND EXPENSES]

For expenses necessary for such advanced research projects as may be designated and determined by the Secretary of Defense[, $520,000,000] *pursuant to law, $455,000,000*, to remain available until expended: *Provided*, That such amounts as may be determined by the Secretary of Defense to have been made available for related programs in other appropriations available to the Department of Defense during the current fiscal year may be transferred to and merged with this appropriation to be available for the same purposes and time period: *Provided further*, That such amounts of this appropriation as may be determined by the Secretary of Defense may be transferred to carry out the purposes of advanced research to those appropriations for military functions under the Department of Defense which are being utilized for related programs, to be merged with and to be available for the same time period as the appropriation to which transferred. (*Department of Defense Appropriation Act, 1959.*)

Appropriated 1959, $520,000,000 Estimate 1960, $455,000,000
Appropriated (adjusted) $399,742,000

Salaries and Expenses, Advanced Research Projects Agency, Department of Defense

Appropriation introduction

	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960
Appropriation or estimate		$520,000,000	$455,000,000
Adjustments by transfers	$83,100,000	−120,258,000	
Unobligated balance brought forward		67,583,806	39,999,806
Unobligated balance carried forward	−67,583,806	−39,999,806	−39,999,806
Total obligations	15,516,194	427,326,000	455,000,000

This appropriation provides for the Advanced Research Projects Agency which is responsible to the Secretary of Defense for the planning, development, administration, and management of the various programs assigned. ARPA is the primary sponsor of military astronautics programs directed toward the improvement of space technology for military purposes and the investigation of specific military application of space vehicles. ARPA is also conducting research and development related to such specific applications of military interest as reconnaissance, communications, navigation, and early warning of ballistic missile attack.

PURPOSE AND SCOPE OF THE APPROPRIATION

The current research and development program of the Advanced Research Projects Agency is concerned primarily with the application of space technology to military problems, with the investigation of improved methods of defense against ballistic missiles, and with propellent chemistry. Work may also be assigned to the Agency in other areas.

1. *Military science.*—Research in solid propellent chemistry. The objective is the discovery of new chemicals, the development of practical methods of synthesis, and the knowledge required to utilize these materials in highly efficient solid propellents. The initial goal is to achieve a 10–20 percent increase in specific impulse over solid propellents now under development.

2. *Missiles and related equipment.*—To achieve improved missile defense, research in the nature of the threat, identification and discrimination techniques, kill mechanisms, and data systems. The objective is to identify advanced techniques for missile defense that will be technically, operationally, and economically feasible.

3. *Military astronautics and related equipment.*—Studies, development, tests, and launchings of early warning, communications, and navigation satellites, and their components. In addition, development of the clustered booster, reconnaissance systems, and exploratory development leading to the application of advanced technology to specific military problems.

4. *Programwide management.*—Executive and technical management at ARPA headquarters.

Summary of program by category

	Estimated obligations	
	Fiscal year 1959	Fiscal year 1960
Military sciences: Solid propellent chemistry	$13,700,000	$18,000,000
Missiles and related equipment: Ballistic missile defense:		
1. Missile flight phenomena	25,000,000	44,650,000
2. Missile and satellite identification and kill	10,000,000	17,600,000
3. Missile acquisition, tracking, and data reduction	23,000,000	35,250,000
4. Feasibility investigations and exploratory research	22,000,000	30,600,000
Subtotal	80,000,000	128,100,000
Astronautics and related equipment: Military space technology:		
1. Sentry	95,000,000	100,000,000
2. Communications	15,000,000	40,000,000
3. Precision navigation	4,500,000	12,000,000
4. Very early warning	12,000,000	18,000,000
5. Cloud cover surveillance	10,000,000	
6. Manned satellite	8,000,000	
7. Discoverer	100,000,000	60,000,000
8. Hi-energy upper stage	15,000,000	
9. Clustered engine booster	19,000,000	50,000,000
10. Tracking and data acquisition	17,000,000	17,000,000
11. Feasibility investigations and exploratory research	13,441,337	10,000,000
12. Scientific space investigations	22,784,663	
Subtotal	331,726,000	307,000,000
Programwide management and support: Executive and technical direction	1,900,000	1,900,000
Total program	427,326,000	455,000,000

EXPLANATION OF ESTIMATES, FISCAL YEAR 1960

Introduction

The programs of the Advanced Research Projects Agency are summarized in the following categories:

Military sciences—Solid propellent chemistry
Missile and related equipment—Missile defense
Astronautics and related equipment—Military space technology
Programwide management and support—Executive and technical direction

The technical programs have been assigned to ARPA by the Secretary of Defense, and the budget estimates have been developed to meet necessary national defense goals in these areas.

Program authority

The Advanced Research Projects Agency was established by DOD Directive 5105.15, February 7, 1958. This directive states that "The Agency shall be responsible for the direction or performance of such advanced projects in the field of research and development as the Secretary of Defense shall, from time to time, designate by individual project or by category."

DOD Directive 3200.5 established a procedure for the actual assignment of projects to ARPA.

Section 7, Public Law 85–325, dated February 12, 1958, as amended by the Department of Defense Reorganization Act of 1958, essentially endorsed the concept of special consideration being given to certain research areas by providing "The Secretary of Defense or his designee is authorized to engage in such advanced projects essential to the Defense Department's responsibilities in the field of basic and applied research and development which pertain to weapon systems and military requirements as the Secretary of Defense may determine. * * * The Secretary of Defense shall assign any weapons systems developed to such military department or departments for production and operational control as he may determine."

The National Aeronautics and Space Act of 1958 provides, in part, "that activities [aeronautics and space] peculiar to or primarily associated with the development of weapons systems, military operations, or the defense of the United States (including the research and development necessary to make effective provision for the defense of the United States) shall be the responsibility of, and shall be directed by, the Department of Defense * * *."

ARPA operations

ARPA was established as a line agency within the Department of Defense. Within program areas assigned by the Secretary, ARPA plans, initiates, and directs specific projects. It performs its responsibilities by directing and funding the work. ARPA has no laboratory operations of its own. It is a small management organization, assisted in the technical aspects of its work by the Institute for Defense Analyses, which, under contract, recommends technical programs and is available for consultation on technical matters.

Classified information

Additional details of a classified nature pertaining to the ARPA programs described in this justification will be provided in supplementary material.

Military sciences

Solid propellent chemistry:

Fiscal year 1959	$13,700,000
Fiscal year 1960	18,000,000

Solid propellants now available are not high enough in performance to allow optimum design of ballistic missiles, ballistic missile defense systems, and other guided missile and space systems. The overall objective of this program is the discovery of new chemicals and development of practical methods of synthesis and the knowledge required to utilize these materials in highly efficient solid propellants. A major aspect of this objective is also the supporting research necessary to make effective use of these high-energy materials and propellants when they become available. The initial objective is to make available for developmental applications solid propellants and the techniques for using them having specific impulses at least 10 to 20 percent higher than other propellants now under development.

The availability of such advanced propellants would greatly increase the capabilities of ballistic type weapons so that significant increases in range and payload or corresponding reductions in weight and volume of the system can be achieved. The availability of such improved performance propellent propulsion systems are of critical importance to the ballistic missile and ballistic missile defense programs. The availability of such improved propellent systems would also be of major significance to all the guided missile programs of the Department of Defense. The possibility of use of such systems in the space program, particularly initial boost phases for launching satellites and space vehicles, is also attractive.

Missiles and related equipment

	Fiscal year 1959	Fiscal year 1960
Ballistic missile defense:		
1. Missile flight phenomena	$25,000,000	$44,650,000
2. Missile and satellite identification and kill	10,000,000	17,600,000
3. Missile acquisition, tracking, and data reduction	23,000,000	35,250,000
4. Feasibility investigations and exploratory research	22,000,000	30,600,000
Total	80,000,000	128,100,000

The threat posed by an enemy ballistic missile complex which is fully operational is of such a nature that conventional concepts of active defense are inadequate to cope with it. Such concepts reach a practicable limit of technical sophisitication in the developing NIKE-ZEUS system of active terminal defense. Before a fully adequate and effective defense can be designed, however, considerably more is needed. The advanced defense must be highly effective in dealing with attempted attacks by ICBM's and IRBM's in all their possible variety and in a technologically developing environment. It must be technically, operationally, and economically feasible and should be achieved with all possible deliberate speed.

The ARPA research program is calculated to fulfill these needs as rapidly, completely, and economically as possible. It has three major facets:

First, advanced defense complexes which meet operational and technical feasibility standards and which employ well-known principles can be predicted at this time only in outline. The detailed knowledge requsite to high-confidence design is still lacking. The ARPA program is carefully constructed to obtain

the necessary detailed understanding from research on a number of fundamental questions concerning the nature of the threat, means for detection, acquisition, and tracking of missiles, and methods of identification and kill. Considerable emphasis is given to obtaining improvements in the state of several essential arts.

Second, the costs of defense, which bear generally a close relationship to the total effectiveness desired, may be exceedingly high. Because of this important economic factor, the advanced defense complex finally selected for development must represent a reasonable optimum among all possible choices. The ARPA program includes conceptual and feasibility investigations which will throw light on the nature of such an optimum complex and demonstrate its advantages.

Finally, it is just possible that unpredictable advances of more-than-usual value or stature may greatly simplify the task of defense. The ARPA program of exploratory research and techniques development is designed to encourage this possibility to a proactical maximum.

Nature of threat.—The threat as visualized by ARPA includes all the methods by which ballistic missiles and satellites may be employed to attack the continental United States and adjacent territories. The time period considered in present planning begins essentially now. Some features of the threat are clearly earlier than others, but all should be available within the next 10 years. Beyond this period, the threat can be expected to become even more varied and severe as a natural consequence of technological progress.

Ballistic missiles are defined as those missiles whose payloads over the greater portion of their flight path are traveling on a ballistic trajectory, the nature of which is determined by the laws of dynamics. Most generally, such trajectories are Keplerian or elliptical orbits which intersect the earth at two points. Of concern are short- and intermediate-range ballistic missiles which can be launched from surface or submarine vessels or aircraft, and ballistic missiles of intercontinental range. Other missile threats are possible, but may reasonably be expected to exhibit a greater vulnerability to an advanced defense complex than ballistic missiles themselves.

A ballistic missile is placed on an appropriate trajectory by the guided thrust of high-power rocket engines which develop the velocity needed by the payload to attain a desired range. For moderate to intercontinental ranges, the velocity is very great, being about 15,000 feet per second for 1,500 miles range and about 23,000 feet per second for 6,000 miles range. Missile attacks may exhibit a wide range of elevation angles and velocities with somewhat greater probability attached to trajectories which optimize payload delivery.

Considering its great energy, the ballistic missile payload must be very tough to get back through the atmosphere. Reentry bodies of a size to deliver H-bombs of various yields can be delivered.

The elementary features of the threat (i.e., the nature of the reentry body itself) as it appears to a defense system are three:

High average velocity—short reaction time;
Compact and smooth—difficult to detect;
Extremely tough—difficult to destroy.

Conventional defense systems, i.e., those employing radar and intercepting missiles, can be built to give a high probability of kill if the attack consists of a small number of identified warhead-containing reentry bodies within their zone of action. NIKE-ZEUS will have a capability to deal with such simple threats even though attacks are complicated by fragments of the rocket propulsion system which necessarily accompany the reentry body.

On the other hand, ballistic missiles deliver payload or tonnage which is at the offense designer's option to divide in a variety of ways. If the defense system is expected to be highly effective against a simple form of attack, the offense will trade yield for countermeasures such as decoys and jammers to take advantage of the natural weaknesses of defense systems and reduce the system effectiveness. The offense purpose, of course, is to maximize the yield (or desired effect) on target either by saturating, confusing, or avoiding the defense system. Some feasible and suitable divisions of payload are given below:

Warhead-containing reentry bodies.—Simple or staged: The body may enter smoothly or be provided with separable drag skirts and so exhibit a very erratic atmospheric flight path.

Unshielded or shielded: Some of the yield may be traded for radiation shielding to reduce vulnerability.

Normal or artificial cross-section: The body may be coated with radar-absorbent material to reduce all radar ranges outside of the atmosphere.

Single or multiple: The payload may be divided into a number of small warhead-bearing reentry bodies.

Decoys.—Radar is a surface- or length-measuring device. Decoys are designed to simulate possible reentry bodies under various conditions. In addition to specially designed decoys, the natural tankage, etc., associated with rocket propulsion systems provides a large number of radar decoys.

Free-space replicas: Very lightweight objects which simulate the reentry body.

Reentry decoys: Objects of considerably greater weight which behave during reentry like warhead-containing bodies.

Combined: It may be possible by advanced techniques to make low-weight objects which simulate reentry bodies both in and beyond the atmosphere.

Chaff: Simple chaff may be used.

Jammers.—Radar is sensitive and is therefore vulnerable to jamming by small active barrage or spot jammers and repeaters, particularly at great ranges.

All such payload divisions, in response to an effective defense system, result in lower total yields delivered above a target but are calculated to result in higher total damage on the target. It should be noted also that multiple missile attacks against given targets will probably be the rule, opening up the possible use of missiles which deliver countermeasures alone.

In the light of the above discussion, it is evident that the defense system may be forced to deal with objects whose behavior is exceedingly complex and erratic, which may appear in great numbers, and which may embody large quantities of warheads. Finally, if indirect effects against populations, such as massive fallout or high-altitude thermal radiation, are employed, the threatening objects will not necessarily ever be within reach of defense systems of purely local capability.

It is the consensus of technical judgment that the attack variations noted, as well as others not discussed, are possible in reasonable future time periods and that therefore the advanced defense complex must comprise elements with an overall capability against the spectrum of the threat.

Major technical concepts.—In view of the potential variety of the threat, a prime objective of defense design is to make the ballistic missile attack in strategic war as expensive and uncertain as possible for the least cost to defense.

A few major concepts have evolved and are under study.

Discrimination techniques try to reject objects which are not warhead-containing reentry bodies or which cannot apparently impact within forbidden areas.

Identification techniques try to positively identify warheads, either by their necessary content, by locating them within a known volume smaller than the confused volume, or by other means.

Combined passive and active defenses: Although passive defense is not the business of ARPA, it is clearly simpler to defend small, hard or dispersed targets than big, soft targets. A greater number of methods are appropriate and the cost for a given effectiveness is much less. An example is to be found in the defense of hardened ICBM missile sites by very low altitude terminal defense systems. This concept is quite well understood but additional worthwhile methods of defense need examination and should be studied.

Very early warning.—Only in the area of very early warning against ballistic-missile attack by an enemy do missile defense activities contribute directly to the strength of our retaliatory capability and do the ability of our people to survive by seeking shelter. Benefits of this sort exist independently of the effectiveness of the active missile defense to which very early warning also contributes.

There are other concepts, less well-defined, which also need further work and are considered in the ARPA programs.

The consensus of technical judgment is that the threat is potentially so varied that the advanced defense complex most probably must exploit several major concepts in its structure. It must also embody a considerable firepower capability to deal with real threatening objects in large numbers.

1. Missile flight phenomena

Fiscal year 1959	$25, 000, 000
Fiscal year 1960	44, 650, 000

It is the purpose of the anti-ballistic-missile effort to prevent damage to the intended target of a ballistic missile. It is a firm assumption that action to destroy ballistic missiles will be taken initially only after such missiles are seen to be in a threatening trajectory. The defensive system, therefore, must be capable of suitable reaction solely on the basis of information gathered during the actual flight of a ballistic missile. It is therefore a requirement that complete experimental information on our own developmental missiles be gathered on those char-

acteristics of ballistic missile flight which will enhance or limit the capability of a defensive system to identify, track, and kill the ballistic missile.

Ground-based measurements are emphasized in this program since they can be most completely and inexpensively performed. Shipboard measurements are required, in view of the limited land masses available on or near the projected ground path of the missile. Airborne measurements are needed in order to observe infrared and optical phenomena with minimum confusing effects from the earth's atmosphere at lower levels. Special range facilities will be required in some cases in order to overcome some of the limitations of developmental ballistic missile programs from affecting in all respects the observations and tests of antiballistic efforts. Supplementary theoretical and laboratory support will be provided to improve the interpretation of the results of the range measurement programs.

2. Missile and satellite identification and kill

Fiscal year 1959	$10, 000, 000
Fiscal year 1960	17, 600, 000

This category provides for a variety of research studies which will generate essential data for use in developing advance discrimination and defense systems against inimical ballistic missiles and satellites.

Ballistic missiles and satellites have characteristics which make them difficult to intercept and destroy because they operate outside the atmosphere. The prime difficulty is that any objects which are ejected from a missile (or a satellite) with a small ejection velocity will travel right along with it because of the absence of atmospheric drag. It is thus possible to generate large clouds of objects surrounding, or displaced from, such missiles or satellites, but having the same general trajectory or orbit characteristics as the dangerous object to be intercepted. The problem of identification of the true warhead (or satellite) then becomes of great importance to the defense. No single method has yet been suggested which will permit positive identification under all circumstances. It thus becomes necessary to depend on combinations of methods and on elaborate correlation and computation schemes in order to have any hope of performing a sorting operation with confidence.

Once the object to be destroyed has been identified, its destruction may still constitute a serious problem. Because it has to reenter the atmosphere and because it needs no wings nor similar weak structure, the warhead reentry body of a ballistic missile is generally tough and can be destroyed only by extreme measures. It is true that satellites are not likely to be quite so tough unless they are designated for reentry. On the other hand, the interception of satellites presents other difficulties such as their greater height.

3. Missile acquisition, tracking, and data reduction

Fiscal year 1959	$23, 000, 000
Fiscal year 1960	35, 250, 000

A very large part of the business of active defense against attacking ballistic missiles or satellites is the task of acquisition and tracking of these difficult targets through equipment able to provide fast and accurate information on their locations, characteristics, and trajectories. Radar remains the strong tool for acquisition and tracking and must be advanced to the utmost. Radar development objectives, which dominate this program, are to attain extremely high power, resolution, precision, and data rate, in order to meet more nearly the heavy requirements of active defense against missiles.

Another major area of study in this category is that of fast, automatic reduction of masses of incoming data, to permit unerring assignment and control of weapons for active defense, together with the related tasks of maintaining and controlling communication of data throughout a farflung defense system, and of displaying reduced data to human monitors and receiving from them control based on their judgment.

4. Feasibility investigations and exploratory research

Fiscal year 1959	$22, 000, 000
Fiscal year 1960	30, 600, 000

To fulfill its mission of conducting that advanced research necessary to guarantee U.S. military superiority, ARPA must examine and test the feasibility of concepts, equipment, and proposals (many of them unconventional) which may come forth unattached to any developmental systems designs. ARPA must generate new ideas and novel techniques which appear to hold promise of significantly improving

and magnifying American defense and offensive capabilities with regard to ballistic missile attacks.

Essentially these investigations and research projects will be looking for major breakthroughs rather than simply refining existing techniques and equipment. They will constitute "advanced research" in the most liberal meaning of the term. All aspects of missile defense will be reviewed including the vehicles, detection equipment, data transmission and handling techniques, the physical properties of materials, guidance and control equipment, and the means for exercising positive military command over weapons systems of the future. Identification of inimical military space vehicles and the development of unconventional kill mechanisms will naturally be an important objective in this type of investigation.

Astronautics and related equipment

Military space technology	Fiscal year 1959	Fiscal year 1960
1. Sentry	$95,000,000	$100,000,000
2. Communications	15,000,000	40,000,000
3. Precision navigation	4,500,000	12,000,000
4. Very early warning	12,000,000	18,000,000
5. Cloud cover surveillance	10,000,000	----------
6. Manned satellite	8,000,000	----------
7. Discoverer	100,000,000	60,000,000
8. High-energy upper stage	15,000,000	----------
9. Clustered engine booster	19,000,000	50,000,000
10. Tracking and data acquisition	17,000,000	17,000,000
11. Feasibility investigations and exploratory research	13,441,337	10,000,000
12. Scientific space investigations	22,784,663	----------
Total	331,726,000	307,000,000

The U.S.S.R. has surpassed the United States in technological accomplishments in outer space. The U.S.S.R., if it long maintains its present superiority in the exploitation of outer space, will be able to use that superiority as a means of undermining the prestige and leadership of the United States and of threatening U.S. security.

It is the responsibility of the DOD to undertake all reasonable steps to checkmate any threat to U.S. security.

The programs here presented have all been initiated in fiscal year 1959, and are aimed at those uses of space for military purposes that have advantages over other solutions to the problems. It is necessary in the planning of a military program in space to fully realize that space is a region (or a place) rather than a thing. This means that space must be considered as complementary and analogous to the atmosphere, the ocean, or to the surface of the earth. We can further conclude that many of the things we can do on the surface of the earth, for example, or in the ocean, we can do in space. Some things can be done in space that cannot be done elsewhere. Thus, it is immediately apparent that only those things which can best be done in space should be in a space program. Or, alternately, that the degree to which they are done in space must be rational in respect to the degree of advantage achieved.

In military reconnaissance, broadly speaking, the several alternatives are observation directly at ground level, observation by aircraft or, finally, observation by space vehicles. It is immediately obvious that each location has certain advantages and certain penalties. Ground level reconnaissance will provide exceedingly detailed and exacting information but it is frequently impossible of access and is always laborious to perform. Aircraft relieves the difficulty of access but introduces errors and hazards. Satellites still further ease access but also make more serious certain problems. By careful consideration of problems and results we may conclude that military reconnaissance by satellite does offer a new degree of freedom of access but exacts the penalty of extreme precision and great sophistication of equipment. The reward consists of a priceless flow of visual and electronic information relating to the surface activities of any region of interest.

In communication a trade-off exists between earthbound systems and satellite systems. Again priceless results are available from a satellite system but only at the penalty of exacting and difficult performance. For example, the satellite communication system of ultimate interest involves the use of a satellite of several thousands of pounds weight in an orbit at 22,000 miles. This requires booster vehicle performance well beyond our current capability. We must therefore en-

gage in the development of carrier vehicles capable of an order of magnitude (or more) greater payload capacity. The rewards * * * all weather communications, doubling of the present global message capacity, and jam-free command links * * * are very compelling and fully justify the effort.

Navigational aids to ships at sea, missile-carrying submarines, and aircraft can readily be provided by orbital equipment.

Ground-based early warning radars give considerably less than the maximum warning of ICBM attack. Warning techniques which detect ballistic missiles during launching are necessary to obtain maximum warning for alerting retaliatory forces, active defenses, and the civil defense. The tremendous flame of a large missile booster or sustainer rocket is found to permit very sure detection of missile launching at very long distances, with the aid of infrared sensing devices located at high altitudes. Satellite-borne infrared early warning systems are very promising and should be developed quickly; it is possible that development of an interim airborne system will also prove advisable.

Weather data and predictions on a global basis for military operations can be greatly improved with satellite systems.

To reach the desired effectiveness in any of the military space technology programs, there must be a vehicle development program that will result in steady growth of payload capability. It is this requirement for ever larger engines that underlies the theme of the military usefulness of space as a place. A significant part of this program is, therefore, devoted to improved engines and vehicles which will permit larger payloads and/or higher orbits in the future.

1. Sentry

Fiscal year 1959	$95, 000, 000
Fiscal year 1960	100, 000, 000

The SENTRY reconnaissance system provided by this development program is designed to fulfill requirements vital to the defense of the United States. In order to provide timely military information vital to defense planning, an orbiting satellite reconnaissance system could be employed to provide at a reasonably early date surveillance of the complex of a potential enemy.

The SENTRY reconnaissance system is composed of the satellite vehicle, the booster, launch facilities, tracking facilities, and a complex communication and data processing network with related facilities.

The satellite-borne advanced reconnaissance development program is divided into two parts:

Engineering prototype tests
Subsystems development

The major activity of this program is concerned with the design, fabrication, and laboratory evaluation of experimental and prototype models of observation subsystems. Such work includes extensive environmental testing of the prototype and determining compatibility with the ground-based systems. Extensive testing will have to be performed to obtain the reliability required for long life unattended operation.

2. Communications

Fiscal year 1959	$15, 000, 000
Fiscal year 1960	40, 000, 000

This project has the objective of developing new communications systems required by the military services. Communication planning studies conducted by the armed services indicate that the continually rising demand for intercontinental electric communications to support our Armed Forces is likely to saturate the capability of conventional systems within the decade. Communications with aircraft for navigational purposes, operational information, and even military strike commands will be greatly improved if a system of communication can be devised which is independent of weather, global location, and enemy jamming action. There is a similar urgent need for communication with fleet ballistic missile submarines.

New modes of global communication will be intensively examined. The use of space satellites as repeater devices appears to be most promising and must be further explored immediately.

Communication methods with satellites may be resolved into real-time repeater communication and delayed-repeater communication. Both methods involve many parameters including height of orbit (up to and including the stationary satellite orbit), cryptographic devices as necessary for security, auxiliary power supplies, stability of orientation, and reliability. A satellite communications

system using the stationary satellite orbit and having suitable numbers of units with proper frequencies and radiated power could provide for increased communication capability amounting to a major fraction of the present total global communications capability. Thus, the economic and security value of these systems are of greatest importance.

Design of the electronics equipment will require intensive development and life testing to provide the maximum in broad band capacity and at the same time to meet the need for absolute reliability in the space environment for periods of time measured in years. Other significant requirements which crowd the present state of the art are lightweight, low power consumption, and antijamming capability.

3. Precision navigation

Fiscal year 1959	$4, 500, 000
Fiscal year 1960	12, 000, 000

Many critical military operations—launching of ballistic missiles from submarines, the initiation of changes in missile in-flight trajectories, for example, demand exact knowledge of location or position. Satellites, by virtue of the stability and predictability of their orbits, have a potential as global all-weather aids to navigation. By incorporation of a radio transmitter, they can emit a signal by which observing stations (ships, submarines, or aircraft) can determine their position using Doppler techniques. Use of this satellite-emitted signal has the advantage of enabling units to learn their exact position. This program will explore the feasibility of the navigational concept.

The initial investigation of precision navigation aids has been started in fiscal year 1959 by initiation of a study of Doppler navigational systems. A relatively simple transponder with coded output will be used in this phase.

4. Very early warning

Fiscal year 1959	$12, 000, 000
Fiscal year 1960	18, 000, 000

Work in this area provides for investigations and studies of means for giving very early warning by observation and interpretation of scientific phenomena directly associated with the launching and early flight of attacking missiles as distinguished from other types of information. It includes major system development of satellite infrared early warning, including flight testing. Studies are included to determine the relative suitability of airborne and satellite platforms for various tasks. Work is programed in advanced intermediate range devices and other passive equipment.

Major studies and research in several supporting areas of basic science are essential to a sound program of major advances in the arts of very early warning.

Because field observation of missiles in flight already indicates great promise, maximum emphasis is placed on the task of applying infrared observations from elevated vehicles to the problem. Since this task area is one in which costs of vehicles and their operation predominate, unbiased studies of the relative suitability of various air and satellite craft as observing vehicles, especially during the development phase, constitute a very important task.

Advance of the art of very early warning will require development of a certain quota of special advanced components. This must be prefaced by studies directed toward defining requirements to be met by new components, such as the properties of new materials that are needed, and for which in turn new methods of synthesis must be developed.

5. Cloud cover surveillance

Fiscal year 1959	$10, 000, 000
Fiscal year 1960	0

Accurate weather forecasting is useful for such military operations as (*a*) air strikes, (*b*) amphibious landings, (*c*) troop and material movements, and (*d*) prediction of radioactive fallout patterns. Satellites hold one promise of rapidly collecting weather data on a global basis. The data collected by satellites should result in increased reliability and accuracy of weather forecasting, particularly in times when local ground observations are not available. This program will explore the application of satellites to this goal.

Because of the general scientific implications of this program, NASA will assume its direction in fiscal year 1960, and funds for its continuation are in the NASA budget.

6. Manned satellite (cooperative program with NASA)

Fiscal year 1959	$8,000,000
Fiscal year 1960	0

Progress in rocketry has reached the point that a capability is fast approaching to place a man in orbit around the earth. Because human participation in space flight will have immense scientific and military implications, NASA and ARPA have joined in a cooperative program.

In 1960, funds for this program are being requested by NASA.

7. Discoverer

Fiscal year	$100,000,000
Fiscal year 1960	60,000,000

This program as now planned is composed of the following:

(*a*) *Engineering prototype tests.*—Specific objectives of the flight tests are the performance evaluation of major components and subsystems as they become available. They progress from flight dynamics investigation through separation tests, vehicle propulsion, guidance and stabilization during coast and transition to orbit, tracking, telemeter, and data link development, and to the preliminary testing of payload components. The purpose of this program is to develop a prototype vehicle suitable for demonstrating early orbital capability. Initial phases of the program use THOR boosters.

Ground tests will be conducted with system components and subsystems, the vehicle structure, and vehicle separation methods. Dynamic testing will be performed at contractor facilities, in wind tunnel tests and on rocket sleds. Experimental and developmental tests will be made to achieve satisfactory subsystem environmental control, heat rejection, radiation shielding and reliability estimates by simulating atmospheric, temperature, and radiation environment expected on orbit. Contractor facilities will be used for functional and operational tests of these subsystems prior to flight test.

The orbital test program is designed to yield actual environmental information as well as system performance characteristics, and will further serve to check out tracking and acquisition capabilities.

(*b*) *Biomedical recovery capsule.*—The biomedical recovery capsule program has three primary objectives. These are:

1. To recover living specimens from orbital flight;
2. To study the psychophysiologic response of specimens to conditions of launch, orbit, and recovery;
3. To build experience and confidence in recovery techniques. These objectives will be achieved by launching biomedical recovery capsules into orbit on DISCOVERER flights. The capsules will be separated from the parent vehicle on later orbital passes and recovery attempted.

8. Hi-energy upper stage

Fiscal year 1959	$15,000,000
Fiscal year 1960	0

As a part of its program for the development of vehicles for military space missions, ARPA initiated work on a new hi-energy upper stage to provide maximum payload capability when used as a second stage to an ICBM vehicle, such as the ATLAS, or as a third stage when the high thrust booster is also used. Because of the great importance of high performance in upper stages, the hi-energy propellant combination of hydrogen-oxygen was chosen.

In fiscal year 1960, responsibility for this project passes to NASA and funds for its continuation are included in the NASA budget.

9. Clustered engine booster

Fiscal year 1959	$19,000,000
Fiscal year 1960	50,000,000

The development of a high thrust booster is approached in the direction of utilizing by parallel clustering engines and tankage from the ballistic missile program. The use of these proven high production components insures minimum development costs and time, while maintaining a very high degree of reliability. Eight engines similar to those used on JUPITER, THOR, and ATLAS will be assembled on one supporting frame. Each engine operates independently and

the arrangement is such that a single engine failure will not necessarily result in mission failure.

The clustered engine is expected to be operational several years before the single chambered engine. The clustered booster combined with an ICBM and a high energy upper stage will be capable of placing 30,000 pounds in a 300-mile orbit, impacting 7,000 pounds on the moon, or placing 4,000 pounds in a 24-hour orbit. The clustered engine, utilizing the NASA-developed 1.5-million-pound engine as a central element of the cluster would have a combined thrust of 2.3 million pounds.

10. Tracking and data acquisition

Fiscal year 1959	$17,000,000
Fiscal year 1960	17,000,000

Space exploration cannot be undertaken successfully without an adequate ground tracking and data acquisition network. It is realized that such a system could become very expensive and therefore careful coordination of the requirements of all potential users of such a network has been required. During the past year, ARPA, with the assistance of the Jet Propulsion Laboratory, studied needs for worldwide space surveillance systems. This study took into consideration the needs of users other than the Department of Defense, with a view to providing mutual service and minimizing duplication. A similar study has been underway within NASA for the past several months. Recently, the two agencies and JPL have joined together as a joint committee. The results of this committee's work has culminated in an agreement between NASA and the DOD.

In essence, the agreement provides for the provision of four additional tracking and data acquisition stations for deep space probe and broad band data readout to be located at separate overseas locations. Two of these stations will be operated by NASA at the outset and two by Defense. Exchange of common data is provided in the agreement. The agreement also provides facilities for man-in-space and minitrack stations which NASA will operate but which will furnish data to Defense.

The need is recognized for two closely cooperating data reception and analysis centers; one operated by NASA as a continuation and expansion of the Vanguard center and one operated by the Department of Defense under Spacetrack management at the Cambridge Research Center. These two centers will exchange data freely and provide mutual support for the national program.

In addition, the so-called satellite detection fence, authorized in May 1958, is being continued by DOD–ARPA. Construction is essentially complete on this system. Experience to date indicates that additional work must be accomplished on this system in order to obtain maximum benefit from the stations now available.

11. Feasibility investigations and exploratory research

Fiscal year 1959	$13,441,337
Fiscal year 1960	10,000,000

To fulfill its mission of conducting advanced research necessary to military space technology, ARPA must examine and test the feasibility of concepts, equipment, and proposals. ARPA must generate new ideas and novel techniques which hold promise of significantly improving military space applications. Essentially, these investigations in research projects will be looking for major breakthroughs rather than simply refining existing techniques and equipment. Specific areas of investigation include auxiliary power supplies, components, and materials development, and advanced control methods.

12. Scientific space investigations

Fiscal year 1959	$22,784,663
Fiscal year 1960	0

During fiscal year 1958, ARPA initiated several scientific space projects such as the lunar probe program. These projects were transferred to NASA effective October 1, 1958. These obligations are in addition to the $59,200,000 transferred to the NASA appropriation.

Programwide management and support

Executive and technical direction:	
Fiscal year 1959	$1,900,000
Fiscal year 1960	1,900,000

The Advanced Research Projects Agency is responsible to the Secretary of Defense for the planning, development, administration, and management of the various programs assigned. In the execution of its programs, extensive use is made of existing facilities and services of the military departments, other Government agencies, universities, and industry. Under this concept of operations, ARPA does not duplicate or add to that which already has been established and available in the way of facilities and personnel to carry out its program. Accordingly, ARPA can execute its overall technical and administrative program planning and management responsibilities with a relatively small staff. Through a contract with the Institute for Defense Analyses, ARPA is provided highly specialized scientific and technical program proposals and evaluations which are vital to the successful development, appraisal, and technical management of specific areas of advanced research, as assigned.

The funds requested provide for the salaries and other necessary expenses such as travel, communications, equipment, supplies, and professional services required in the planning, direction, and management of the program of advanced research.

General Statement

Mr. Johnson. Mr. Chairman and members of the committee, this appearance before your committee to explain our fiscal year 1960 budget request coincides closely to the anniversary of the establishment of the Advanced Research Projects Agency. Consequently, I would like to review briefly the manner in which ARPA has been operating during the last year, indicate some of the program decisions that have been made and activities initiated, and then proceed to comment on the programs included in our fiscal year 1960 budget.

You will recall that ARPA was established to perform advanced research in areas to be assigned to us by the Secretary of Defense. We are responsible for the planning and development, administration, and management of the programs assigned which so far are in the areas of propellent chemistry, advanced missile defense and military space. In the execution of these programs, we make extensive use of existing facilities and administrative organizations of the three military departments and other Government agencies. Under this concept of operations, ARPA does not duplicate or add to that which has already been established or is available to carry out its programs. Through a contract with the Institute for Defense Analyses, ARPA is provided highly specialized scientific advice and program proposals and evaluations which are vital to the successful development, appraisal, and technical management in specific areas of advanced research. Thus ARPA is able to excute its overall technical program planning management responsibilities with a relatively small staff.

At the time ARPA was established, it was given the interim assignment of initiating space projects of basic scientific interest pending the establishment of the civilian space agency. Much of its effort during the first few months was devoted to defining and initiating projects of this kind.

These included lunar probes, cosmic ray experiments, and inflatable spheres. Responsibility for these projects was transferred to the National Aeronautics and Space Administration upon their activation on October 1.

Military programs have been undertaken encompassing cloud cover surveillance, satellite tracking and surveillance, improved propulsion, namely, a 1½-million-pound thrust clustered engine and a high energy upper stage, as well as satellite systems for navigation, communication, and very early warning. The military reconnaissance program

transferred from the Air Force was continued, and studies were commenced to ascertain the feasibility of various advanced space systems.

I have with me a more detailed chronology of ARPA space activities which may be placed in the record if the committee desires.

(The chronology may be found on pp. 20 et seq.)

Numerous projects are underway in the field of solid propellent chemistry, and a comprehensive program of advanced missile defense research has been inaugurated.

Many of the projects initiated during the past year are reflected in our appropriation request for 1960. The unclassified budget submitted to the committee discusses these programs to the extent possible. To the extent that the committee is interested in classified details, we would be glad to discuss them in executive session with you.

In summary, the ARPA request for 1960 which totals $455 million includes $18 million for propellent chemistry, $128.1 million for research in advanced techniques of ballistic missile defense, $307 million for military space projects, and $1.9 million for planning and management costs.

Our activities in propellent chemistry research have the objective of the discovery of new chemical combinations capable of producing greater rocket thrust; the development of practical methods of synthesis; and the techniques required to utilize these materials in high efficiency solid propellents. The initial goal is to achieve a 10–20 percent or greater increase in specific impulse over solid propellents now under development. In this program, we are utilizing the competence and resources of several large chemical concerns where a broad integrated research and development program can be effectively carried out. We have a number of small contracts with specialty laboratories, universities, and research foundations on some of the computations and fundamental research aspects of the problem. In addition, there are Government laboratories with traditional programs that could contribute knowledge to this endeavor such as some of the military laboratores, Bureau of Mines, and the National Bureau of Standards, and we are utilizing them where appropriate. The request of $18 million for fiscal year 1960 compares with $13.7 million in 1959.

The defense of the United States from direct military attack is, of course, an ultimate objective of our defensive military strength. Because of the change in technological concepts being utilized in military activities, it is necessary in the foreseeable future to have increasing effectiveness against these new military weapons including intercontinental ballistic missiles. Without prejudice to the several programs underway which will provide the best defensive capability now possible in accordance with the state of the art, our program is concerned with further advancing the techniques of missile defense. Our efforts in this area are concerned with defining improved methods of warning; the nature of the threat; identification and discrimination techniques; kill mechanisms; and, as an integral part of these complicated new systems, data processing techniques. Fundamentally, we are looking for advanced techniques of missile defense that will be technically, operationally, and economically feasible. It is estimated that $80 million will be obligated for this activity in fiscal year 1959 with $128.1 million requested to be appropriated for 1960.

All of the space programs for which we are requesting money have been initiated this fiscal year or, in some cases, last year. They include

satellite applications of reconnaissance, communications, navigation, and early warning, all of which have important military significance. In the field of space technology, we have the DISCOVERER program and the clustered engine booster. We are cooperating with the National Aeronautics and Space Administration in establishing a tracking and data acquisition network, and our budget includes numerous feasibility investigations and exploratory research projects which will contribute to our forward looking activities.

Two projects being pursued by ARPA in fiscal year 1959 are being transferred to NASA in the fiscal year 1960 budget due to their dual applications. They are cloud cover (or meteorology) and the development of a high energy upper stage for use on ATLAS.

Excluding the projects transferred, or to be transferred, to NASA from the 1959 amount, funds requested for military space increase $31 million, from $276 million in 1959 to $307 million in fiscal year 1960.

The final item, executive and technical direction, continues in fiscal year 1960 at the previous level—$1.9 million.

This concludes my prepared statement.

ARPA BUDGET REQUEST

Mr. SHEPPARD. You will proceed with making your statement covering this subject matter and we will interrupt you only when it comes to a subject we will need clarified.

Mr. JOHNSON. Thank you, Mr. Chairman.

As a separate organizational entity within the Department of Defense, ARPA is responsible for basic and applied research and development of advanced projects assigned by the Secretary of Defense. On the basis of assignments to date, the Agency is primarily concerned with the application of space technology to military problems, propellent chemistry, and the investigation of improved methods of defense against ballistic missiles.

The ARPA program and related budget estimates for fiscal year 1960 total $455 million which compares with an adjusted fiscal year 1959 base of $427.3 million.

A program breakdown of our fiscal year 1960 budget requirements is as follows: Solid propellent chemistry, $18 million; ballistic missile defense, $128.1 million; military space technology, $307 million; and executive and technical direction, $1.9 million.

Because of the dynamic nature of our programs, it became necessary to make some adjustments in the allocation of fiscal year 1959 funds during this past week. These reprogramed funds include the receipt of $32 million from the Secretary of Defense's emergency fund for the DISCOVERER and MIDAS projects.

I shall now discuss each of our project items.

SOLID PROPELLENT CHEMISTRY

In the past, solid propellents have been formulated from readily available materials. The present state of the art has nearly reached the limit of performance expected by simple formulation of these materials. However, the performance of solid propellants developed to date is not high enough for many of the military uses required of present and future programs for missiles and rocket boosters. ARPA,

therefore, has embarked upon a program in this area to bring about major improvements and advances in solid propellent chemistry.

The overall objective of this program is the discovery of new chemicals, the development of practical methods of synthesis, and the acquisition of knowledge required to utilize those materials in highly efficient solid propellants. The initial objective is to make available for developmental applications, solid propellants, and the techniques for using them, having specific impulses at least 10 to 20 percent higher than other propellants now under development.

Mr. FLOOD. This is in the area of the so-called exotic fuels?

Mr. JOHNSON. No. Solid propellent chemistry is not really classified as one of the exotic fuels.

Although the 10 to 20 percent increase once achieved may appear small, the results are dramatic. These increases will result in greater ranges, considerably higher payloads, or significant reductions in the gross weight of the missile.

In order to achieve the objectives of this research program, ARPA has established four approaches, all of which are competitive to a degree:

1. On the basis of proposals from major chemical organizations, four contracts were awarded for comprehensive research endeavors in solid propellants. This work, broad in scope, involves ingredient synthesis studies; thermochemistry, thermodynamics, and performance calculations; propellent formulation and properties investigations; and necessary related chemical engineering and research.

2. Additional industrial research contracts are also being sponsored with the intent to exploit some particular specialized skill on the part of the contracting organizations in the field of high energy ingredients and propellants, synthesis, combustion, kinetics, high temperature tolerance of inert components, performance calculations, and the supporting research necessary to permit effective use of new high energy materials when they become available.

3. A third approach has been pursued through contracts with universities and nonprofit organizations.

In this area, ARPA is supporting basic research in the field of solid propellants to obtain information concerned with the necessary chemistry and physics for achieving the desired objective. These studies are required since the basic chemistry and thermochemistry of the elements most likely to be used in high performance solid propellants are not well understood.

4. Government "in house" programs have also been established. Work being carried out in these laboratories includes synthesis, engine cooling techniques, detonation studies, thermochemistry, and new compound evaluation and characterization.

The solid propellent program was initiated in fiscal year 1959. In fiscal year 1960, the efforts of the various contractors and activities will increase as the programs progress to an optimum level of effort and as they move on to the more advanced phases of the research with emphasis on chemical engineering and evaluation on the larger scale of materials and new propellants.

In summary on this subject I would like to say this: We have exhausted the possibilities of the present chemicals which now exist on the shelves. We have just about run out the string. The only way

we can now leapfrog is to invent new chemicals, and formulate new breakthroughs.

This is the purpose of this investigation.

Mr. FLOOD. This is research and development, basic and otherwise, in connection with chemicals for the purpose of creating solid propellants.

Mr. JOHNSON. Right.

Mr. FLOOD. This does not include that area of exotic fuels in connection with solid propellants such as analysis and utilization of materials like beryllium.

Mr. JOHNSON. If beryllium is a component which could be used more effectively in solid propellent chemistry, yes, it would apply; but exotic fuel work is being carried on separately in the other three services. This is a separate program.

Mr. FLOOD. Why is it separate?

Mr. JOHNSON. This has not been assigned as such to ARPA. ARPA is to stay entirely in the area of solid propellent chemistry. To the degree that solid propellent materials not now being used can be used to make a better solid propellant we will investigate them, that is correct. But there are other fuels which will be used in the liquid or gaseous state that are not in this program.

Mr. FLOOD. Remember, we are laymen. I want to be assured by you that you are not experimenting in the so-called exotic fuel even though they can be and should be utilized in solid propellants. Is that so?

Mr. JOHNSON. Colonel Lay, to your knowledge are we mixing in this program any elements of the so-called exotic fuels investigation?

Colonel LAY. You have to define exotic fuels. This is really hard to do.

We are examining light metals which could possibly be used for solid propellants. Whether you consider these as exotic fuels or not I do not know.

Mr. FLOOD. The reason I interrupted at this point is because you are dealing with a subject now which, as far as I am concerned, I have to follow step by step. I cannot wait 20 minutes and examine you on this kind of thing or I might as well stay in bed.

Mr. SHEPPARD. Off the record.

(Discussion held off the record.)

Mr. FLOOD. I am talking about using exotic fuels, or any elements that might be exotic fuels, for the purpose of solid propellants for missiles. A solid propellant is nothing more than a solidification of a liquid, gas or chemical, or any combination thereof. A solid fuel is merely a congealing of chemical or mineral elements to make it solid for the purpose of storage or easier handling or all of the other more efficient things. That is the purpose of it chiefly.

I have in mind beryllium as one thing I pick out of the air. Certainly beryllium is the kind of metal in the area of exotic fuels, liquid, gaseous, or otherwise, to be utilized for a solid propellant. Is that true?

Mr. JOHNSON. That is correct. This is in our program.

Mr. FLOOD. Certainly it is.

Mr. JOHNSON. Our confusion was the definition of the term "exotic fuel."

Mr. ANDREWS. Would you describe exotic fuel for us?

Mr. JOHNSON. I think we cannot agree completely on what we mean by exotic. Broadly it is used to mean the things that are not now commonly used which are off in the blue sky.

Mr. ANDREWS. The fuel you hope to get?

Mr. JOHNSON. Yes. I think you use exotic in that sense very broadly.

I would say that we are exhausting every possibility of any new material, any new chemical, that can add to the specific impulse in solid propellent chemistry.

Mr. FLOOD. Will you tell us now what are the components, chemical, or chemical action upon minerals, or any combination thereof, what is the formula in the POLARIS solid propellant or in the proposed MINUTEMAN solid propellant? What are the elements so we know what you mean by solid as distinguished from exotic?

Mr. JOHNSON. This would get technical beyond our ability here this morning to describe these elements.

Mr. FLOOD. You can tell us what is in the solid propellant. What do you have in POLARIS solid and what do you have in the proposed MINUTEMAN solid? There must be certain elements we can recognize so we know what you are talking about instead of these wild blue yonder exotics.

You are now dealing with certain known components. What are some of them?

Mr. JOHNSON. Our basic research is an attempt to get new chemicals, new components which will be added to this library of materials that we can then formulate new propellent chemistry from.

Mr. FLOOD. I understand that and I did not ask you that.

I asked you what are the components in the existing solids that are being used for propulsion, or will be used for propulsion, in the first generation of POLARIS and in the first generation of MINUTEMAN. What are some of the components in that solid?

Mr. JOHNSON. Colonel Lay, will you speak to that?

(Discussion off the record.)

Mr. SHEPPARD. Proceed with your statement.

BALLISTIC MISSILE DEFENSE

Mr. JOHNSON. The next program is that of ballistic missile defense. The program is divided into four major areas: missile flight phenomena; missile and satellite identification and kill; missile acquisition, tracking and data reduction; and feasibility studies and exploratory research. The higher dollar level for fiscal year 1960 reflects a buildup of efforts begun in fiscal year 1959 to seek out an effective and economical defense against enemy ballistic missiles. The program comprises those advanced phases of the ballistic missile defense program which are not included in the Air Force Ballistic Missile Early Warning System (BMEWS), or the Army NIKE–ZEUS system.

Over the past several years, there have been a number of elaborate studies of complete ballistic missile defense systems which have considered the detailed components necessary for detection, identification, tracking, and kill of ballistic missiles. Without exception, we believe that these studies have left as unknowns major questions concerning the actual characteristics of ballistic missiles flying above and then reentering the atmosphere. Also there are a number of unre-

solved questions concerning feasibility of such things as kill mechanisms. For this reason, the initial ARPA ballistic missile defense program is directed chiefly toward acquiring much needed answers to outstanding questions on each component which makes up a missile defense system through a concentrated and vigorous research program. Before any feasible and effective missile defense system is developed, we must first understand the nature of the threat, which is extremely varied and complex, and consider the means for detecting a missile or satellite in a time period which will permit the employment of proper defenses. After detection, the missile must be identified. We must know if its trajectory is threatening, if it contains a true warhead, if it is a scientific exploratory type vehicle, or if it is merely a decoy. Then, of course, once identified as a warhead-containing missile, we must find positive means of destroying it.

In addition to these approaches, we must proceed with advanced conceptual studies and feasibility investigations so that unknowns which may greatly simplify the task of defense are not overlooked.

Mr. FLOOD. Do you bracket missiles and satellites in the same conceptual program?

Mr. JOHNSON. We treat them separately.

RESEARCH OBJECTIVES

Our overall objective in the area of ballistic missile defense is to do those things which would make it feasible to build a defense of North America against ballistic missiles arriving from greater distances and from all directions. The threat posed by an enemy ballistic missile conquest is of such a nature that conventional concepts of active defense are inadequate. An advanced ballistic missile defense system must be, first of all, technically feasible. It must be highly effective in dealing with attempted attacks by ICBM's and IRBM's of all varieties and in all types of environment. Moreover, it needs to be operationally feasible to cope with all the complexities of a defense system such as logistics, communications, personnel, and the human factors. Third, it must be relatively economical. There are many choices that will probably develop for a missile defense system, but the cost relationship to a total effectiveness may be exceedingly high. Therefore, we must develop a system which represents a reasonable optimum among all possible choices. Then, of course, an overriding consideration is that of achieving this optimum system at the very earliest date.

MISSILE FLIGHT PHENOMENA

The first area of our research program in ballistic missile defense is that of the phenomena of ballistic missile flight. Here we are concerned with taking measurements of the missiles high in flight and of the reentry into the atmosphere. We must learn all the unknowns and characteristics of missiles to enhance a capability of a defensive system. To this end, we are gathering scientific information from missiles which are available to the United States today. One program initiated to collect this vitally needed data is the shipborne measurements program. ARPA is providing for the instrumentation of a converted Liberty ship, the *American Mariner*, for observing normal missile firings on the Atlantic Missile Range. Another project

is the shipboard measurements aboard the motor yacht *Acania* which has been equipped with large quantities or radar. Also planned are ground-based measurements. These ground-based programs are less expensive to perform but are very limited in flexibility of use because of location. To observe the various phenomena, we are also conducting an airborne measurements program. All of these programs are supplemented by theoretical and laboratory support to improve the interpretation of the results.

All of these projects should give us a good picture of what processes take place during launch and reentry of ballistic missiles. None of the present research radars, however, has sufficient power sensitivity to make useful observations during the long midcourse flight of the ballistic missile outside of the atmosphere. It is in this phase of the missile flight that, from a defense standpoint, interception is most desirable. ARPA is procuring two radars for research measurement purposes. These radars will have very high power and advanced characteristics representing the most advanced current art.

Mr. FORD. Are those in addition to and more powerful than the BMEWS radar which are in the course of being procured now?

Mr. JOHNSON. That is right

Mr. FORD. Where will they be stationed, or have you not made that decision?

Mr. JOHNSON. That decision has not been finally made.

Mr. FLOOD. Do you understand this conceptual program is a step beyond what we now term "a next generation," beyond BMEWS and NIKE-ZEUS?

Mr. JOHNSON. This is all in an effort to leapfrog.

Two of the principal problems which have not been satisfactorily solved are identification of the enemy warhead from decoys and other objects and development of a satisfactory positive mechanism for destruction of the missile.

The discrimination problem can be explained by pointing out that the greater part of the flight of a ballistic missile of intercontinental range occurs outside the atmosphere. Since there is no air to retard material, any object which starts with the ballistic missile will follow much the same path and end up at or near the target. A large number of many decoy-type objects are capable of flying along with the warhead and cannot readily be separately identified by radar or telescope. Because interceptors are very expensive, it is not possible to shoot at every object that might be seen.

Mr. FORD. These other accompanying objects, which I presume would be part of the firing——

Mr. JOHNSON. That is right.

Mr. FORD. How widely dispersed do they get?

Mr. JOHNSON. It could be dispersed for miles. If the impact were great enough or if there were a springing action they could be ejected and go out for long distances. The radar sections of even very flimsy material might look like a big thing and it is almost impossible, from the known art today, to determine the real warhead from the fake.

Mr. FORD. And this side dispersion could be part of the offensive decoy threat?

Mr. JOHNSON. That is right.

Mr. FLOOD. Any one of the decoys can easily be beyond the kill impact area of the warhead.

Mr. JOHNSON. That is right.

Mr. SHEPPARD. What you are presenting here today, as I interpret your presentation, is completely projecting research and development in these fields you refer to as these charts unfold, and insofar as any definite aspect of this is concerned, you do not have it. That is why you approach this thing as you are, for the purpose of research to reach final determinations. Is that correct?

Mr. JOHNSON. That is correct, sir.

Hence, the difficult problem is finding the real warhead. The best technique available to date involves the observation of these objects. The difficulty with this solution, however, is that the atmosphere is not dense enough and the speed of the reentry body may be so high that by the time an interception is made the reentry body may be at a dangerously low altitude.

The consideration of methods to be used for discrimination will probably have to be extremely diversified and, therefore, all possible techniques must be investigated. A large number of projects must be undertaken. Some of these involve the phenomena which occur at reentry. Some consider the simulation of reentry conditions at high altitudes by use of artificial atmospheres.

Once the object to be destroyed has been identified, its destruction may constitute a very serious problem.

(Discussion off the record.)

An integral part of an active defense system against attack by ballistic missiles or satellites is that of tracking and acquiring data from these extremely difficult targets. Radar is limited in providing fast and accurate information on location and characteristics. The object of the projects we are contemplating in this area is to develop extremely high power, resolution, and accuracy systems of very long range to meet the heavy requirements placed on an active defense system.

To be useful for long-range ballistic missile defense, radars must have very long range. As a consequence, such radars become extremely expensive.

(Discussion off the record.)

DATA PROCESSING

In addition to complete radars, we are sponsoring a number of investigations in radar techniques. These include studies of ways to measure very small differences in distance, while at the same time using very high power, and methods of handling the tremendous amount of data that comes from radar. The data processing problem includes high speed reduction of vast amounts of radar and other sensor data, calculation of trajectories, weapon assignment, transmission of data over large distances at high speeds, and AICBM guidance.

(Discussion off the record.)

Mr. JOHNSON. One of the most serious phases of the data handling problem is that of deciding when to release the defensive missile. Within a very few minutes of first warning, a determination must be made whether an enemy attack is in process and, if so, all necessary actions must be taken. The relationship between machine and man, under such circumstances, is a most important problem and is receiving our fullest attention.

FEASIBILITY STUDIES

In order to be completely covered in our research in ballistic missile defense, we must generate more ideas and novel techniques which appear to hold promise of improving and magnifying American defensive capabilities. This is being done through exploratory research and feasibility studies. Included in projects to be undertaken in this category will be investigations and research which will seek rational breakthroughs rather than simply refining present techniques and equipment. The same idea here as in propellent chemistry. This area of work can truly be termed advanced research. We must stay a jump or two ahead of a potential enemy at all times. As examples of projects to be pursued in this category are such items as studies of detection equipment, data transmission and handling techniques, physical properties of materials, structures, and mechanisms, guidance and control of equipment, space based weapons systems, positive command of weapon systems of the future, and satellite interceptor systems.

Mr. FLOOD. When you use the phrase "satellite interceptor," do you use it in the sense of intercepting a satellite as a weapon, or do you use it in the sense of counteraction against an enemy satellite in orbit, or both?

Mr. JOHNSON. Both.

Of course, included will be studies of the effect of nuclear weapons on the atmosphere. These studies will concentrate on the results which were produced during the ARPA sponsored ARGUS experiment during the fall of last year. And Colonel Lay, who is with me here, was the officer in charge of that for ARPA.

Through these investigations in exploratory research, we hope to save considerable time and money by preventing our going down blind alleys in ballistic missile defense.

(Discussion off the record.)

SPACE TECHNOLOGY

Mr. JOHNSON. Now I shall turn to the largest segment of ARPA's effort in terms of dollars—military space technology. A $31 million increase over fiscal year 1959 is requested for the DOD continuing projects in fiscal year 1960. NASA is budgeting the fiscal year 1960 funds for those projects which we will have transferred to NASA by us by the end of this fiscal year. I shall discuss the transferred projects later in this presentation.

Mr. FLOOD. Who determines what will be transferred from NASA to Defense?

Mr. JOHNSON. Final determination is with the President, on the advice of the space council. However, up to now the determinations have been made pretty much jointly with the Secretary of Defense and the Director of the National Aeronautics and Space Agency. As I said to you yesterday, my technical staff is not in complete agreement with the transfers. I personally am. However, if the work involved on which we need to progress is not done on the timetable to which we have agreed, and funded in the amounts that are believed needed we are going to advise the Secretary and we will ask for correction.

Mr. FLOOD. You mean the Secretary of Defense?

Mr. JOHNSON. The Secretary of Defense, yes.

Mr. FLOOD. Who determines tomorrow who will transfer what item from you to the civil people?

Mr. JOHNSON. The Secretary of Defense jointly with the Director of the National Aeronautics and Space Agency.

Mr. FLOOD. They must agree?

Mr. JOHNSON. They must agree. If they do not agree, then they go to the President.

Mr. FLOOD. The President is the final deciding arbiter as between those two?

Mr. JOHNSON. That is right, sir.

PROJECT SENTRY

The Sentry project is part of what was formerly termed the advanced reconnaissance satellite project or, as you knew it several years ago, WS–117L.

The Sentry reconnaissance system provided by this development program is designed to fulfill requirements vital to the defense of the United States. In order to provide timely military information vital to defense planning, an orbiting satellite reconnaissance system could be employed.

The Sentry reconnaissance system is composed of the satellite vehicle, the booster, launch facilities, tracking facilities, and a complex communication and data processing network with related facilities.

The satellite-borne advanced reconnaissance development program is divided into two parts:

Engineering prototype tests and subsystems development

The major activity of this program is concerned with the design, fabrication, and laboratory evaluation of experimental and prototype models of observation subsystems. Such work includes extensive environmental testing of the prototype and determining compatibility with the ground-based systems. Extensive testing will have to be performed to obtain the reliability required for long-life unattended operation.

(Discussion off the record.)

Mr. JOHNSON. If I may proceed with the next.

Mr. SHEPPARD. Proceed.

COMMUNICATIONS SATELLITE

Mr. JOHNSON. The next military space project is the communications satellite. The critical importance of adequate communications in modern warfare is self-evident and does not require elaboration. The missile and atomic era make essential rapid communications of high reliability between any points of the world. Present systems do not provide these qualities. The communications program contemplates development of both delayed and instantaneous active repeater satellites to provide the military services vitally needed expansion of intercontinental trunking capacity together with a high degree of reliability and immunity to weather, geographic location, enemy jamming, and sabotage.

It is currently planned that the initial part of the communications satellite program will be the Courier-delayed repeater system.

Project SCORE, initiated in August 1958, and successfully accomplished on December 18, 1958, is recent and dramatic evidence of the potential offered by orbiting communications relay systems. SCORE demonstrated the utility of putting into orbit communications equipment capable of receiving, storing, and retransmitting messages. A development program has been undertaken for the prototype of an operational delayed repeater relay system. This system is to have a capacity equivalent to 20 continuously available 100-word-per-minute teletype channels available at ground stations located around the world. The transmission system will be capable of integration with existing communication systems.

A later phase of the communications satellite program is the active repeater, capable of receiving and retransmitting messages on an instantaneous basis from 5,600 and 19,000 nautical mile orbits. At the 19,000 nautical mile height, they will complete one revolution around the earth every 24 hours, hence their characteristic of maintaining position over a given point on the globe when positioned over the equator. For point-to-point service, the equatorial orbit appears to be optimum with three or four satellites equally spaced around the world.

Mr. FLOOD. Will this type of communication keep talking to you, or must you ask the questions?

Mr. JOHNSON. This is a constant communications system. You can talk back and forth. The delayed repeater is not in that category. Like SCORE, you have to interrogate that when it passes over you.

(Discussion off the record.)

So much for communications satellite. Now we shall go on to placing navigational satellites in space.

NAVIGATION SATELLITES

The Department of Defense has an important requirement for placing navigational satellites in space. Use of satellites for navigation amounts to practical utilization of the satellites' similarity to the stars, the traditional foundation of navigation. The important navigational difference, however, is that a satellite can be fitted with a radio source which can be heard and detected by any ship, submarine, or plane at any time of day or night regardless of weather conditions. This will be of particular value to combat aircraft and ships and ballistic missile submarines, POLARIS.

The navigation satellite program is planned to provide an instantaneous all-weather system for determining position at any point on the globe. In principle, the receiving station will listen to a radio frequency signal transmitted by the satellite as it comes up over the horizon. This signal frequency is initially shifted due to the rate of approach of the satellite to the receiver. The satellite will relay to the receiving station the signal for the shift, a coded signal of synchronous time and a coded signal representing the orbital characteristics in effect. By properly using this information, the circle of position may be located within about four-tenths of a mile. As precise knowledge of the satellite orbit and times are known, accurate geographic positions can be determined.

(Discussion off the record.)

Mr. SHEPPARD. Will you explain what the Doppler techniques are?

Mr. JOHNSON. It is awfully difficult for me to describe the Doppler, effect too.

Colonel LAY. Maybe I can use the example of the train coming toward you. Everybody uses that. The pitch of sound of the train whistle increases as it comes toward you, and lowers as it goes away from you. This is the principle of the Doppler technique.

Mr. SHEPPARD. You are in the decibel field there, are you not?

Mr. JOHNSON. It is the equivalent of that, yes.

Colonel LAY. Yes, sir; you are in that frequency range.

Mr. SHEPPARD. Thank you very much.

Mr. SIKES. How are decibels related to this program?

Mr. JOHNSON. Measurement of sound. Of course, this is radar. You can use the analogy.

Mr. OSTERTAG. Is not that changing so fast it would be almost impossible to measure distance?

Colonel LAY. No, sir.

Mr. JOHNSON. With radar this can be very accurate. You can get your position anywhere in the world within four-tenths of a mile. This is not theoretical work. As a matter of fact, I think that all of the satellite work we are talking about here today is quite different from the ballistic missile defense. In ballistic missile defense we are doing a great deal of highly theoretical work as compared with the satellite work. I look on the satellite job as a big engineering effort. There is not too much mystery in it. There really isn't. It is doing a good engineering job. Defending ourselves against ballistic missiles, however, we have to develop whole new fields of science.

Mr. FORD. Yet, 5 or 6 years ago, sitting on this same committee we heard about missiles, and we were then thinking in the research area and not in the engineering field. It shows the change with time.

Mr. JOHNSON. There is quite a difference, I think, at this point in time. Of course, the scientists do not agree with me when I make this statement. I am not a scientist, so I can talk freely in this area.

What I am trying to do is to debunk the scientific mystery of space as we are going to use it in the military. I quite agree that when you begin to explore Mars and Venus and interplanetary travel, there is a great deal of science which needs to be added, but we shall work here in the area relatively close to the Earth.

For example, I do not know whether we appreciate the fact that a satellite going 300 miles over Moscow is the distance from here to my home in Stamford, Connecticut. We shall be that close to the Kremlin, and Russia is that close to us with its satellites. To understand the nature of the threat and the nature of the problem, we ought to think in terms of how short these distances really are.

Mr. FORD. Did you tell us the schedule on that? I do not recollect hearing it.

Mr. JOHNSON. I am sorry, I did not finish the statement. The first navigation satellite in the program is scheduled for launch this summer, with another planned in the spring of next year.

Mr. FORD. And how many are envisaged in the program?

Mr. JOHNSON. There are three envisaged in the preliminary program. I must make clear we are doing only the R. & D. work. We would hope to turn over to the proper department or command or other agency the operational job of putting these satellites up for

operational purposes after we have successfully completed the research and development work.

(Discussion off the record.)

Mr. FLOOD. As I understand it, the plumbing in this is not so sophisticated that it will get in its own way. It is a practical, intelligent, not supersophisticated piece of plumbing and hardware.

Mr. JOHNSON. This is our objective. It will always be simplified and always be made more reliable as we conduct more experiments.

Mr. OSTERTAG. Mr. Director, may I ask, in connection with this timetable where you leave off and another part of the Defense Establishment takes over, is that the end of development or the beginning of development?

Mr. JOHNSON. When another agency takes over, of course, there is a new R. & D. effort which comes into being to make it better, to make it more reliable, but that will be their R. & D. work, not ours.

Mr. OSTERTAG. You would not call that operational, but still in the phase of development?

Mr. JOHNSON. Every program will be determined to be operational when it assists a military function operationally. The first operational devices may be quite unsophisticated, may be only relatively reliable. Their work then will have to go on from there to make it more reliable, to make it do more things more effectively at less cost.

Mr. SHEPPARD. It is really a component part of your duties, as I interpret them, to keep the respective agencies from overlapping, one with the other. In other words, you hand it down in rather definitive state within the range of acceptability, and they pick it up from there.

Mr. JOHNSON. That is right. Our program here is to prevent the kind of duplication which has existed in the missile field.

Mr. SHEPPARD. Go ahead.

VERY EARLY WARNING SYSTEM

Mr. JOHNSON. The next project is Very Early Warning or MIDAS. We might have discussed MIDAS under the ballistic missile defense. As a matter of fact, the people who are responsible for MIDAS in ARPA are the ballistic missile defense people, primarily, rather than the satellite people. MIDAS is an experimental missile defense alarm system based on detection techniques which will permit fulfilling an urgent requirement for early warning of an enemy ICBM attack. There is good evidence that the MIDAS satellite can increase and perhaps even double the warning time provided by ground-based radars. They would also be immune to radar countermeasures.

(Discussion off the record.)

PROJECT DISCOVERER

Mr. JOHNSON. The next project is DISCOVERER. Incidentally, I can say, in addition to what you read in the paper this morning, that DISCOVERER, the one we launched April 13, 1959 did what it was supposed to do: eject its capsule on the 17th pass. As you read in the papers, we ran into a snafu on the timer. If that had not happened, the thing would have come down just where we wanted it on the 17th pass at 7:30 last night in the South Pacific not too far from Hawaii. As it is, we think now that it came down in the polar region.

We have reason to believe we got the signals. We have alerted all the BMEWS people up there to look for it. The can, of course, is continuing. It has radio in it. The signals there indicate that it is tumbling now, which is what it was supposed to do. Once it kicks the satellite out, it lost its stabilization ability, so it is tumbling.

DISCOVERER provides for a research and development program directed toward increasing the capabilities, reliability, effectiveness, and useful life span of all military satellites.

The immediate objectives of the program are the development of a number of systems, components, and engineering techniques through flight tests; the development of operational system techniques and procedures; and the achievement of orbital capability of the basic satellite vehicle. The aim of these tests is to perfect guidance control, to achieve stabilization of the vehicle in orbit, and to develop and perfect recovery techniques of satellite payloads. These are three very important factors which are vital to the operation of satellites programed for military purposes.

This was the first satellite by the Russians or ourselves that ever was stabilized; in other words, moving around pointing to the earth all the time. This is an American first.

Mr. FORD. Is that really important?

(Discussion off the record.)

Mr. OSTERTAG. Is the DISCOVERER a missile with a booster?

Mr. JOHNSON. Yes, the DISCOVERER has a THOR first stage and a builtup second stage.

Anyway, the launch of a DISCOVERER 2 days ago was successful in every respect except that it did not return to the earth in the right place.

Mr. FLOOD. My friend Andrews is concerned about traffic control.

Mr. JOHNSON. Yes, there will be a traffic problem. There will be hundreds of these things in the air.

Mr. FLOOD. With the other fellow throwing them and maybe two or three other people, too.

Mr. JOHNSON. Satellites scheduled later in the program, and I hope the very next ones that will go next month, will contain biomedical experiments. The first ones will contain mice. We will finally wind up with a primate.

Satellites scheduled later in this program will contain biomedical experiments to seek data on capsule recovery, recovery of living specimens from orbital flight, psychophysiologic effects of launch, orbit, and recovery techniques. This program will be extremely useful to the man-in-space program, Project Mercury, being carried out by the National Aeronautics and Space Administration with Department of Defense support.

The vehicles to be used in the DISCOVERER project consist of a THOR first-stage booster, combined with a Lockheed upper stage powered by the Bell-Hustler engine. Later phases of this program may utilize the ATLAS booster for larger payload capability. All vehicles to be launched in this program will be fired from the Pacifio Missile Range.

Mr. FLOOD. You are looking for recovery in all of these?

Mr. JOHNSON. Yes. We intend to recover these specimens. Of course, we do not intend to put specimens up there unless the chances

of recovery are very good, but we do want to know how they react in this capsule, what happens to them physically.

Mr. SHEPPARD. May I ask one question that presents a problem from my point of view. In effectuating the stability to which you have referred, what contribution would that make to returning it back to earth again? Does it assist?

Mr. JOHNSON. Does what assist?

Mr. SHEPPARD. You just described the fact that a stabilized satellite experiment has been successfully conducted. I say, does that particular control contribute to bringing, for example, a manned satellite back to earth?

Mr. JOHNSON. Yes; it contributes to many things. For example, when we put a man up there in the Mercury program, he cannot spin, either. He would go crazy. He would die. So it has to be stabilized to be pointing in the same direction at all times.

Mr. SHEPPARD. You have perfected the stability?

Mr. JOHNSON. We have perfected the stability which will be used in many things.

Mr. SHEPPARD. A wonderful accomplishment.

Mr. JOHNSON. The first DISCOVERER, as you know, was launched in February.

Mr. SIKES. Presumably the dog the Russians put up in a satellite lived for several days. Did they not have some degree of stability?

Mr. JOHNSON. No; they did not have stability. This is probably one of the reasons why the dog did die relatively soon. It died in a matter of days.

Mr. SIKES. It would have died in a matter of days anyway, Mr. Johnson.

Mr. JOHNSON. It might not have. We do not know how they were feeding the animal. The chances are they were intravenously feeding the animal, and they did have a supply of oxygen.

Mr. FORD. Can we tell whether theirs are stabilized or not by instruments of our own?

Mr. JOHNSON. Oh, yes.

Mr. MINSHALL. Have the Russians released that detail?

Mr. JOHNSON. Yes; their literature has told us about the dog. Isn't that right, Colonel Lay?

Colonel LAY. Yes, sir. The Russians have provided details on the dog.

Mr. JOHNSON. We have details on what happened to the dog.

Mr. OSTERTAG. Have they released all the information with regard to their projects?

Mr. JOHNSON. No, they have not.

Mr. SHEPPARD. They never do.

Mr. JOHNSON. They have not.

The need for such a large number of DISCOVERER launchings is predicated on the fact that the satellites will orbit for only short periods of time at relatively low altitudes.

It is hoped that through this program we can develop an all-purpose vehicle, with a wide range of application covering a variety of military space payloads that require payloads in space in a stabilized condition.

I think the airplanes will be snatching the payloads in the air. We won't even need the Navy. I may be too confident, but I am confident by the end of the year we shall have this on a routine basis.

Mr. SHEPPARD. On the subject of elimination, what else are you eliminating besides the U.S. Navy?

Mr. JOHNSON. It is very expensive to have the fleet out there.

Mr. SHEPPARD. It is expensive to have up a bunch of bombers, too.

Mr. JOHNSON. I suspect a half dozen airplanes would not be quite as expensive as the fleet.

Mr. SIKES. Bring me up to date. What does the airplane have to do with this?

Mr. JOHNSON. It snatches this satellite as it returns to earth. It gets a signal, flies out, puts out its net or its hooks and hooks it in the air gently. This thing has a parachute on it and comes down rather slowly toward the end.

Mr. FORD. It is a butterfly-catching technique.

Mr. JOHNSON. Yes. Once we know where it is, it is not too much of a problem to snatch it. The problem is knowing when it will reenter.

Mr. FLOOD. The Air Force has been snatching things around here for 10 years. It is time they were getting good at it.

Mr. SHEPPARD. Go ahead, Mr. Johnson.

Mr. JOHNSON. Colonel Lay will discuss the consolidated satellite schedule.

Mr. FLOOD. Colonel, why are you so hot in this?

Mr. JOHNSON. Colonel Lay is assigned by the Air Force. He is one of a dozen officers assigned to ARPA by the three services. He has been with me for a year. He is Deputy Director of our Technical Operations Division. The Director of that is a civilian, Dr. Golovin, who was chief scientist at White Sands. Colonel Lay is his deputy, running my technical programs on the ARPA side of the show. He is a physicist. He has his master's degree in physics. He has a fine career. He has been decorated several times for unusual work in the Department of Defense. He is one of our stalwarts. He wears his uniform very proudly.

Mr. SHEPPARD. Off the record.

(Discussion off the record.)

Mr. FORD. When all of these things are operational, even in the crude state, you are going to have a much better detection system for missiles than some of these sophisticated radars that you were talking about, BMEWS and others, and the time schedule does not seem too much different.

Mr. JOHNSON. That is right.

Mr. FORD. Why do we do both, or is that out of your province?

Mr. JOHNSON. I think during the period here we are not spending billions of dollars, we are only spending millions relatively. I think that we have to take parallel approaches, planned duplication. I would hope MIDAS would be so cleared that the military and the scientific community would agree that would be the one to go all out on.

SOVIET EFFORTS ON VERY EARLY WARNING SYSTEM

Mr. MINSHALL. What are the Russians doing along the line of the program of the MIDAS and NAVIGATION?

Mr. JOHNSON. It is my opinion that they are spending—and this is merely an opinion—very little money on defensive systems. They do not think we are going to attack them first and my guess is, there-

fore, they are not doing much in this area. I also guess they are pursuing a very vigorous program of putting men into maneuverable satellites as an offensive and psychological weapon. That is purely a guess from the fact they got a dog up so early.

Mr. MINSHALL. It has been some time since we have had information that they have even launched a satellite.

Mr. JOHNSON. It has been almost a year since they put a satellite in orbit around the earth. They put a satellite around the sun recently, but I am talking about the earth.

IMPORTANCE OF MANNED SPACE VEHICLES

Mr. SHEPPARD. The field that we are in is very difficult to understand and you have done a very good job of presenting this, but if you had a manned missile, which would you determine would be the most effective, the man-controlled missile or the missile that we are presently discussing?

Mr. JOHNSON. Sir, I think that I can answer it this way: The programs that we have been talking about here today use the new space environment to make military operations more sophisticated as we now know them. For example, we improve our communications, we improve our early warning capability, and we improve our navigation.

Now, a man in space would be used entirely differently. He would then mastermind a new kind of weapons delivery system. For example, you could say that 20 years from or even 10 years from now, we would store all of our weapon systems in space because we could not hide them from an enemy on land or water. They would know where they were. If you hid such delivery systems in outer space you would then want to have maneuverable craft manned by men who could work in this area and they would control their operations. You would not be able to control that from the ground at all times electronically. That is why I think getting a capability to maneuver in space by a man is of utmost importance if you follow logically what could happen over the next 10 or 20 years.

Mr. FLOOD. Can we create a conceptual plan that would so move all weapon systems of all great nations into outer space in the future to such an extent that with manned satellites operational in outer space, and with great weapon systems operational in outer space, that the war would be fought in outer space and that whoever would win there would win and that what would result on earth would be merely a result of what transpired in space and actual combat or damage to the earth and its people would be residual, if anything?

Mr. JOHNSON. There are those who have conceptually created such a condition of a future war; yes.

Mr. SIKES. All right, Buck Rogers, let us get back down to earth. How important in practical values is it for us to put men into space and men into satellites? Machines apparently can think faster, can compute faster, and work faster than men. What is the real value of having men in outer space? I am not convinced this is nearly as important as additional workable missiles.

Mr. JOHNSON. I think there are a number of reasons. First, of all, equipment does fail.

Mr. SIKES. Is the man in space going to have tools and time to fix the equipment?

Mr. JOHNSON. Men are going to be needed to repair equipment. Actually, the theory that you can do electronically something better than by man has not been proven on earth. Every device that we have carried to the ultimate point of perfection, man somewhere has——

(Discussion off the record.)

Mr. SIKES. I think the man in space program is greatly overemphasized and I have seen no convincing proof that it has much practical application. I think that we achieve more effective and important results with other programs we now have than we will be able to do with a man in space. Certainly we will waste valuable manpower, time, and money if we are just trying to get a man into space ahead of the Russians. They don't care how many are killed in the process, we do.

Mr. JOHNSON. The role of knocking down an enemy satellite, for example, can probably better be performed with a man maneuvering a craft to knock it down, or to immobilize it, or to determine whether it is lethal.

Mr. SIKES. It appears to me greater control can be exercised from the ground for the foreseeable future.

Mr. JOHNSON. I am talking about those things in orbit, a weapon in orbit, and a man in a craft that could maneuver to visit that satellite and determine whether it was in fact a bomb. He might be able to immobilize it. He might be able to knock it down.

Mr. SIKES. How far ahead are you thinking?

Mr. JOHNSON. Sir, I work on just one theory—if the Russians put up a couple of men into a maneuverable craft that passes over the United States at regular intervals, ahead of us, I think psychologically this will have a tremendous impact. That I am convinced of. I am quite sure that this would be very bad. The question then would be—what are you going to do about it? There is no way we know of to knock down that craft. Psychologically if we could say, yes, we have a couple of guys up there over Russia and we can maneuver to intercept and immobilize his craft, then it is no longer dangerous. I think that beyond that the Russians could very well put the equivalent of a SAC weapon system into orbit and at any predetermined point it would be quite simple to store them there and drop them on earth and maneuver them onto targets with high accuracy, which would not be possible with electronic devices.

Mr. SIKES. You have not told me how far ahead you are thinking.

Mr. JOHNSON. Oh, I would say that I am thinking 10 to 30 years. Let us settle for 20 years.

Mr. MINSHALL. According to the newspapers and other news media. there have been indications that the Russians might put a man in orbit in the next few months. Do you care to comment on that?

Mr. JOHNSON. I do not think we have knowledge at all as a basis for such an opinion or conjecture. My feeling is that they have a capability of doing this earlier than we. How much earlier I would not be able to conjecture. We will not have this capability short of 2 years. I think they have a capability of considerably less than 2 years, but I doubt if it would be a couple of months.

Mr. SHEPPARD. Proceed with the balance of your statement.

DEVELOPMENT OF LARGER ROCKET ENGINES

Mr. JOHNSON. To keep pace with urgent requirements to place larger military payloads into orbit, the development of a 1½ million pound thrust booster, using a cluster of available rocket engines from the ballistic missile program has been initiated. It was decided that pending development of a single chamber booster of equal force, which is a long-term research and development effort, we should exploit the capability existing within the state of the art as rapidly as possible to meet immediate requirements. Through this approach of using proven components of other programs, we can meet our goal of a very large thrust capability within minimum development costs and time while maintaining a high degree of reliability.

This will work with one or two engines out. This is the idea of the multiengine airplane.

To this end, the first major goal in this program is to demonstrate a full-scale captive test firing by the end of 1959 with the booster test flights to begin in late 1960. Under this program, an operational clustered booster will be capable of placing a very large payload into orbit several years before the availability of the 1½ million pound thrust single chambered engine under development by NASA.

Mr. FORD. They are working on the single chamber and you are working on the cluster?

Mr. JOHNSON. Yes. We have a definite military requirement for this to get the communications satellite into a 24-hour orbit, and we need this considerably ahead of the availability of the single engine which may be 5 years away.

Mr. SIKES. Was the big Russian engine which was made operational to launch their large satellite a single-chambered engine or a clustered engine?

Mr. JOHNSON. We really do not know, but it is my opinion it is a cluster or the equivalent. I think that they have a highly developed reliable IRBM they have been using for this purpose and the clustering you can argue.

Specifically, the capabilities of the clustered booster when mated with upper stages are placing of 30,000 pounds in a 300-mile orbit, or placing 6,500 pounds in a 24-hour orbit when launched from the Atlantic Missile Range. This is what we will use for the communications satellite.

Depending on the specific design of the complete vehicle, those weights may be higher. Looking to the future, the clustered engine, utilizing the NASA developed 1½ million pound engine as a central element of the cluster, will have a combined thrust of 2.3 million pounds.

Mr. FORD. That does not mean that it will be in orbit just for 24 hours?

Mr. JOHNSON. No. It is stationary. If you put it up 19,000 nautical miles on the Equator then it will go around the earth as we move. Anywhere over the Equator it would stand still.

Mr. ANDREWS. How many engines will put that in orbit?

Mr. JOHNSON. Eight.

Mr. ANDREWS. How many could conk out?

Mr. JOHNSON. Two could fail and it could still perform 90 percent of its mission.

Mr. ANDREWS. That is a great advantage?

Mr. JOHNSON. That is why we went for the cluster in such a big way, because it does use the multiengine plane idea.

Mr. ANDREWS. The ATLAS has four engines.

Mr. JOHNSON. Three.

Mr. ANDREW. What would happen if one of the three conked out?

Mr. JOHNSON. It will fail. They would have to destroy it.

TRACKING AND DATA READOUT

Obviously, as time goes on, there will be many satellites in orbit at one time. There undoubtedly will be many nonradiating as well as radiating satellites. For this reason, ARPA has been assigned the task of formulating for the DOD a tracking and data readout system to locate and track and provide various data on military satellites, both United States launched and those launched by other nations. These tracking problems concern satellite activities only and not ballistic missiles which have been discussed earlier.

For radiating satellites, there is the military satellite detection fence network, various data acquisition stations of the National Missile Ranges, and others in Hawaii and Vandenberg Air Force Base provided for the DISCOVERER project.

For nonradiating satellites, the currently available capabilities consist primarily of the Millstone radar in Massachusetts, and the Trinidad radar at the Atlantic Missile Range, along with other smaller radars.

Since these facilities have certain limiting factors, it was decided in June 1958 to modify and extend the tracking fence to produce the capability of detecting, identifying, and orbit predicting of nonradiation objects in space. Construction of this fence across the Southern United States is essentially complete. The fence, which is now primarily used for research purposes, will ultimately have operational use. Data from the fence will be transmitted to a central station at Dahlgren, Va., for reduction and transmission to interested agencies, pending the establishment of an interim filter center at Bedford, Mass.

I have just sent a letter to the Secretary of Defense, with copies to the Joint Chiefs of Staff, asking that this fence be assigned to an operational command. ARPA has done its job. Somebody must now be assigned the responsibility for its operation.

In addition to the DOD facilities, we also acquire data from the tracking facilities of NASA, such as the 85-foot dish at Goldstone and the IGY tracking system.

Mr. SHEPPARD. What contribution has the big Navy dish made to this general scheme?

Mr. JOHNSON. I believe it has a very limited use. It cannot be used at all in satellite work.

Mr. SHEPPARD. What is the diameter of your dish?

Mr. JOHNSON. The ones ARPA is installing are 85 and 60 feet.

For the future, ARPA visualizes the need for a national space surveillance coordination center which will serve the military and scientific community. It would be responsible for cataloging all earth satellites and space vehicles. This organization should also set a broad program for advancing capabilities in tracking and data acquisition as well as in data reduction readout, analysis, and dissemination of information.

In order to assure a well-integrated system of facilities, equipment, operating frequencies, and communication nets, required for an effective worldwide ground-based surveillance system, a decision was made in October 1958 to undertake a comprehensive study of the subject. In early January 1959, an agreement between NASA and the Department of Defense was reached on joint implementation and use of worldwide space tracking, data acquisition, and communications networks.

In addition to the tracking facilities of both agencies in being, additional tracking and data acquisition stations will be provided, three operated by the DOD and two by NASA. DOD and NASA will each have a data reduction center. This arrangement provides for full cooperation and joint inputs and use of facilities in meeting the requirements peculiar to our various programs. Separate facilities were deemed necessary to supplement each agency's program to provide for the separate and unique tracking and data requirements of two programs. To assure no duplication, a joint NASA–DOD technical committee will monitor the program.

FEASIBILITY STUDIES

The next category of work in the military space technology area is entitled "Feasibility Investigations and Exploratory Research." In order to achieve our intended role of advanced research, we must always be alert to new and unique concepts, equipment, and proposals, and examine and test them as warranted to advance the state of the art for military space systems. We simply cannot afford to be satisfied with the refinement of current concepts. Rather, it is our aim to have component development precede operational requirements by several years to avoid the restriction in the rate of development of important promising concepts.

Among the studies which will be pursued are ion propulsion for space power; the concept of a maneuverable recoverable satellite vehicle called Mrs. V; space platforms; many ideas on auxiliary power for military space applications; exotic materials and structures urgently needed in building and constructing vehicles and payloads for the short- and long-termed operations in a space environment; space-based operations and the nuclear-bomb-propelled rocket to propel a vehicle weighing several thousand tons to velocities several times those required to escape the earth gravitational field.

We have authorized a contract to see if we can put up a space platform of several thousand tons by the detonation of several small rockets. Some of the best men of the country are working on this.

This is but a partial listing of some of the ideas we are studying. It is in this area which some term "blue sky" projects where we can expect the major breakthroughs which are required to keep our defense posture ahead of our potential enemy.

A space platform of a very large size is going to be needed if we undertake interplanetary travel. We have to go beyond the earth's atmosphere and then we enter another vehicle if we are going to travel to Mars or Venus.

PROJECTS TRANSFERRED TO NASA

There are four projects which ARPA initiated for DOD but which have been or will be transferred to NASA by the close of fiscal year 1959 and funded by it in the future. These projects had been initiated prior to the establishment of NASA in September 1958. The $57.2 million transferred to NASA by Executive order is in addition to the obligations indicated here.

The man-in-space effort is now primarily being done by NASA. The NASA program, as I indicated earlier, will benefit from the DISCOVERER project. In addition, we made available to NASA the $8 million which we had programed in fiscal year 1959 for work directly related to the Mercury project.

Because meteorology research is deemed to be primarily a civilian type activity, the technical and management direction of our cloud cover program will become the responsibility of NASA. All the scientific projects which we initiated, such as the lunar probes and explorer satellites, were transferred immediately after NASA set up operation.

On June 30 of this year, the high energy upper stage or CENTAUR project will become a part of the overall national booster program supported by NASA. CENTAUR is a liquid hydrogen and oxygen rocket which ARPA initiated to form a complete high energy upper stage for a satellite launching. Used either as a second or third stage vehicle, it provides a major increase in the military payload which can be placed in orbit. CENTAUR, therefore, will provide maximum payload capability which is so urgently needed to meet our planned military programs. The present schedule calls for the delivery of the operational upper stage in 1961.

EXECUTIVE AND TECHNICAL DIRECTION

The last category in the budget is executive and technical direction. Included in this item are all the costs associated with the planning, development, and management of the advanced research projects program. ARPA is a "line" type agency. As such, I report directly to the Secretary of Defense. All our technical programs, however, are under the supervision and coordination of the Director of Defense, Research and Engineering.

ARPA is small in structure. There are three major divisions: Technical Operations, Financial Management and Reports, and Policy and Planning. Through a contract with the Institute for Defense Analyses, ARPA is provided highly specialized scientific and technical assistance needed in carrying out a highly technical and complex program. As of April 1, we had a total of 61 professional people together with necessary clerical and stenographic support. Of this total, 27 were Government employees and 34 were contractor employees.

Once a program has been assigned ARPA by the Secretary of Defense, an assessment of the state of the art in the field is made and the program is studied from the point of view of what has yet to be accomplished. Then a complete series of technical projects is developed to carry out the program. Although we can contract direct to have our work performed, usually we assign the projects to

one of the military services or to another Government agency for execution on our behalf. In some cases, work will be done in Government-owned facilities, while in others the work will be contracted to industry or universities. In this manner, we need not duplicate services and facilities already available.

OPERATING POLICIES

This budget and the programs I have described to you are based on project assignments from the Secretary of Defense in accordance with the DOD directive which establishes ARPA. The Secretary of Defense and the Director of Defense (Research and Engineering) have emphasized several times the necessity for an organization like ARPA within the DOD to initiate and carry on research and development work in fields not easily identifiable by one of the military services in the preliminary phases. As ARPA projects are proved out, they will be assigned by the Secretary of Defense to the military services for operational responsibility. In like vein, as new areas of research require centralized initiation, it is expected that the Secretary of Defense will assign to ARPA projects beyond those you have seen today.

This concludes the budget items, and at this point I would like to inject a word of caution. It is quite easy in a presentation of this kind to leave one's listeners with the impression that within the program outlined, technological problems are well in hand, and that the realization of final systems is simply a matter of dollars. We are optimistic that our schedules will be met, but we must not belittle the severe technological problems that will be encountered. There will be setbacks and, we hope, breakthroughs, but we are opening entirely new fields of research and development and it will require an all-out effort by the most technologically capable people that we can recruit, both in Government and in industry.

I shall be happy to answer any questions.

Mr. SHEPPARD. We will stand adjourned until 2 o'clock.

(AFTERNOON SESSION)

FUTURE COSTS

Mr. ANDREWS. Could you hazard a guess as to what the execution of the program that you have outlined would cost?

Mr. JOHNSON. Over a long period?

Mr. ANDREWS. Yes.

Mr. JOHNSON. Is this for the record?

Mr. ANDREWS. Yes.

Mr. JOHNSON. We at the moment believe that the 1961 appropriation will have to be about a third more than the 1960 appropriation.

Mr. ANDREWS. That is for R. & D.?

Mr. JOHNSON. That is right, for the total program that we have been discussing here today. And 1962 will have to be a third more, and then we face the very important decision in 1963 as to whether we go all out or retreat.

Mr. ANDREWS. Let me see if I understand you. One-third more in 1961 than in 1960?

Mr. JOHNSON. Than we have asked for fiscal year 1960. We have asked for $455 million.

Mr. ANDREWS. You expect in 1961 it will be——

Mr. JOHNSON. $150 million more.

Mr. ANDREWS. And in 1962?

Mr. JOHNSON. Another third, which would be $200 million more.

Then by 1963 we are either going to stabilize or you will add $1 billion to it or $2 billion. It will explode.

Mr. SHEPPARD. Mr. Johnson, I would like to have you explain to the committee how you manage your funds, including the degree of supervision you exercise over execution of your programs or projects.

Mr. JOHNSON. The Advanced Research Projects Agency is made up of some 27 professional people who depend on technical advice and assistance from a contract with the Institute For Defense Analysis, which is a nonprofit organization, and who in turn have available for us 34 scientists recruited from industry, nonprofit organizations and universities, in addition to IDA's permanent employees. We depend almost entirely on this group of scientists, half of whom are Ph.D.'s, for our technical backup. So our total professional personnel is in the range of 60 men. They are backed up with clerical and stenographic help.

Early in ARPA's history it was proposed that ARPA acquire an in-house capability by taking over ABMA at Huntsville, taking over other in-house Government laboratories that had a space capability.

I visited these facilities and decided that in the long term if we would use the capabilities of any laboratory that existed anywhere in or out of Government we could have a greater flexibility and not be strapped with a permanent type organization.

Actually it would be far better to give a contract to an organization for 1 year to pursue a line of work, and if they do not perform, do not renew it. That is a good way——

Mr. SHEPPARD. When you use the term "nonprofit" it has no significance as such. You enter into a contract for a given price. Is that true?

Mr. JOHNSON. Yes.

Mr. SHEPPARD. What they do with the money after it gets in there is something else, but the cost element to the Government is comparable to any other business. "Nonprofit" means nothing, then.

Mr. JOHNSON. The stockholders do not get a dividend.

Mr. SHEPPARD. It goes into an operation that we are all familiar with. It goes back into their revolving fund as I understand it. Is that correct?

Mr. JOHNSON. That is right. There is no profit dividend declared to the stockholder.

Mr. SHEPPARD. Have you projected the estimated total cost of your continuing projects, such as the CENTAUR project or the communications project, so that we may have some idea of what we may be committing ourselves for in future years? Do you have that resolved to a reasonable degree?

Mr. JOHNSON. Yes, sir. If you accept the going rate of this approval we will need approximately a third more money in fiscal year 1961.

PROGRAMS CANCELED

Mr. SHEPPARD. Have you had any real project failures which you have been called upon to cancel out?

Mr. JOHNSON. Yes, we had one program that I authorized, and on second judgment did cancel it. That was a program involving a JUNO IV, as we called it, a missile group to be developed by ABMA based on JUPITERS. We concluded that our program would be less costly if we used the THOR and the follow-on ATLAS missiles rather than proceeding with the JUNO IV, and I did cancel a big program which involved some modest cancellation charges. This is the only one I can recall in the last 14 months.

FUND BALANCES

Mr. SHEPPARD. Can you supply for the record if you do not have it immediately available what funds you have unexpended or uncommitted as of the last date you have?

Mr. JOHNSON. We will supply that for the record.

(The information requested follows:)

Advanced Research Projects Agency—Status of appropriation "Salaries and expenses, ARPA" by major programs as of Mar. 31, 1959

[In thousands of dollars]

Major program	Estimated obligations	Commitments	Obligations	Expenditures [1]
Solid propellants	$13,700	$14,200	$6,723	$655
Ballistic missile defense	55,000	30,600	15,479	1,333
Space technology	377,126	304,000	244,421	128,135
Executive and technical direction	1,900	1,900	298	984
Total	447,726	350,700	266,921	131,107

[1] Includes expenditures for obligated balances carried forward to fiscal year 1959 and obligations incurred during fiscal year 1959.

COOPERATION FROM OTHER AGENCIES

Mr. SHEPPARD. Are you getting full cooperation of the military services and from agencies outside of the Department of Defense?

Mr. JOHNSON. Yes, I think I can honestly say we are, but I would be less than candid if I did not say that some one or more of the military services feel that space activities particularly should be entirely within their province, and there is one particularly who I believe honestly feels this to be the case; but I cannot say that we have failed to get their cooperation to the maximum. I enjoy very good relations with this agency.

Mr. SHEPPARD. You refer to difference of opinion in certain things. Is that correct?

Mr. JOHNSON. Yes.

(Discussion held off the record.)

HISTORY OF ARPA

Mr. FORD. I think we ought to have in the record, Mr. Johnson, a very short chronology of ARPA's history.

Could you tell us when it was established, when you took office, the derivation of the first funds? In other words, what was the first year in which ARPA had funds set up for it, where those funds came

from, either by direct appropriation or by transfer from other agencies in fiscal 1959——

Mr. JOHNSON. We will start with 1958.

Mr. FORD. Yes, then in 1959. Do it by fiscal year.

I gather from your request here for fiscal 1960 you are to derive all of your funds by direct appropriation. Is that your contemplation?

Mr. JOHNSON. Yes, Mr. Ford, we are, although I would be again less than candid if I did not say that I expect that we will be requesting and will secure as we can prove the need for funds from the emergency fund.

I would not here say that it is without the realm of possibility that next year we would ask for supplemental funds.

At this moment, however, the only money we can justify on a programing basis is what we have requested.

Mr. FORD. In this chart for fiscal 1958 and fiscal 1959 will you show all transfers in from the emergency fund or from any other source so that we have the chronological story of the agency's existence?

Mr. JOHNSON. Yes, we will be happy to do that.

(The information requested will be found on page 131.)

TRANSFER AUTHORITY

Mr. FORD. I notice in the language proposed for fiscal 1960 the same provisions which would permit the Secretary of Defense apparently to transfer into your agency from other agencies in the Department of Defense. Is my assumption correct?

Mr. JOHNSON. That is right. There could be two kinds of programs, first, new programs if the Secretary should decide to assign to ARPA new projects that were not covered here today, and presumably these would have been funded in one of the services.

For example, Mr. Ford, he might decide to assign basic research in materials, and say there is a high urgency for us to get basic research started on materials in universities, to get a breakthrough on things industry will not finance, and therefore transfer $5 million from research programs of the three agencies and assign it to ARPA.

Then there is another kind of transfer that could happen. For example, we are dealing with communications. This is a very important critical area. It could be possible within the year that communications money for the less exotic communications than we have been talking about could be transferred from one of the military departments to ARPA because it would be decided that this communication program offered greater payout than laying a cable to England, for example.

That kind of transfer I see as a possibility. I am not predicting it but it is there as a potential method.

Mr. FORD. In your judgment the continuation of this transfer authority is essential for the proper functioning of your agency?

Mr. JOHNSON. Very essential.

NIKE-ZEUS

Mr. FORD. As I recall this morning you did not discuss NIKE-ZEUS. Is that still under your cognizance?

Mr. JOHNSON. No, sir. A year ago this committee did approve a NIKE-ZEUS appropriation which early in the summer we concluded should be transferred to the Army. The NIKE-ZEUS did not have the advance research potential that we thought when we presented the budget, so we transferred $57.7 million to the Army and said that they should supervise the R. & D. to that degree.

We withdrew from programing its supervision.

TRANSFERS TO NASA

Mr. FORD. Has DOD transferred any funds from your shop to NASA?

Mr. JOHNSON. Yes.

Mr. FORD. What would that total be?

Mr. JOHNSON. $59.2 million, and in addition by the end of this year we will have transferred programs of another $50 million that they will fund out of their budget in 1960.

Therefore, although we transferred only $59 million we transferred $110 million worth of work.

Mr. FORD. That they will fund in fiscal 1960?

Mr. JOHNSON. Yes.

Mr. FORD. In this chart that I asked for earlier, or in this series of charts, will you show this?

Mr. JOHNSON. Yes. We will show not only actual transfers but we will show the transfer of assigned work in terms of money.

(The information requested follows:)

ARPA administrative history

A. ORGANIZATION AND PROGRAM

Date	Authorization	Remarks
Feb. 7, 1958	DOD Directive 5105.15	Established ARPA.
Feb. 7, 1958		Roy W. Johnson appointed Director.
Feb. 11, 1958	Public Law 85-322	Authorization was provided for the Secretary of Defense to transfer not exceeding $10 million from any appropriation available to the DOD for fiscal year 1958 for advanced research projects as he may designate and determine, and also to transfer and merge with this any amounts determined to have been made available for related programs in other appropriations available to the DOD during fiscal year 1958.
Feb. 12, 1958	Public Law 85-325	Congress authorized the Secretary of Defense or his designee to perform advanced research of a military nature; and for a period of 1 year to perform advanced space projects as may be designated by the President.
Mar. 15, 1958		DOD entered into a contract with the Institute For Defense Analyses to provide ARPA highly specialized scientific advice and program proposals and evaluations which are vital to the successful development, appraisal, and technical management in specific areas of advanced research.
May 1, 1958		Program assignment to ARPA of all satellite and other outer space vehicle programs to be conducted by the DOD, including the VANGUARD series of satellites.
June 7, 1958		Program assignment to ARPA for advanced research in the field of high-performance solid propellants including the supporting research necessary to permit effective use of these high-energy materials when they become available.
June 12, 1958		Program assignment to ARPA of long-range phases of the ballistic missile defense program.
Aug. 6, 1958	Public Law 85-599	The Defense Reorganization Act of 1958 authorized the Secretary of Defense or his designee to engage in advanced research projects essential to the Department of Defense.
Aug. 20, 1958	Public Law 85-685	The Secretary of Defense was authorized to establish or develop installations and facilities required for advanced research projects and in connection therewith was authorized to acquire, construct, convert, rehabilitate, or install permanent or temporary public works, including land acquisition, site preparation, appurtenances, utilities, and equipment, in the total amount of $50 million.
Aug. 22, 1958	Public Law 85-724	Congress appropriated for ARPA $520,000,000 for expenses necessary for such advanced research projects as may be designated and determined by the Secretary of Defense.
Aug. 28, 1958	Public Law 85-852	Funds in the amount of $50,000,000 were approved by Congress for the purposes of Public Law 85-685. The funds are to be derived by transfer from the appropriation "Salaries and expenses, ARPA."
Oct. 1, 1958	Executive Order 10783	NASA established. Scientific space projects undertaken by ARPA pending establishment of NASA were transferred.
Mar. 17, 1959	DOD Directive 5105.15	DOD Directive No. 5105.15, dated Feb. 7, 1958, was superseded by a new charter which conforms to the Department of Defense Reorganization Act of 1958.

[1] The 3 major program assignments are indicated. Additional assignments dealt with specific projects within these program areas and were, in most cases, classified.

ARPA administration history—Continued

B. FINANCIAL

FISCAL YEAR 1958

Date	Source	Salaries and expenses
Mar. 14, 1958	From "Contingencies, DOD" to "Salaries and expenses, ARPA"	$10,000,000
Apr. 30, 1958	From "Emergency fund, DOD" to "Salaries and expenses, ARPA"	8,000,000
May 16, 1958	do	12,530,000
June 27, 1958	do	16,570,000
June 30, 1958	do	36,000,000
	Total availability	83,100,000

FISCAL YEAR 1959

Date	Source	Salaries and expenses	Construction
July 15, 1958	From "Research, development, test and evaluation, AF" to "Salaries and expenses, ARPA"	$170,000	
Aug. 20, 1958	Public Law 85-685, authorization for construction		
Aug. 22, 1958	Public Law 85-724	520,000,000	
Aug. 28, 1958	Public Law 85-852, approved transfer up to $50,000,000 from "Salaries and expenses, ARPA" to "Construction, ARPA"		
Sept. 8, 1958	From "Aircraft, missiles and related procurement, AF" to "Salaries and expenses, ARPA"	12,000,000	
Oct. 14, 1958	From "Salaries and expenses, ARPA" to "Aircraft, missiles and related procurement, AF"	−8,000,000	
Oct. 17, 1958	From "Aircraft, missiles and related procurement, AF" to "Salaries and expenses, ARPA"	4,500,000	
Oct. 22, 1958	From "Salaries and expenses, ARPA" to "Construction, ARPA"	−9,827,000	+$9,827,000
Oct. 30, 1958	From "Salaries and expenses, ARPA" to "Procurement of equipment and missiles, Army"	−42,210,000	
Do	From "Salaries and expenses, ARPA" to "Research, development, test, and evaluation, Army"	−15,500,000	
Nov. 7, 1958	From "Salaries and expenses, ARPA" to NASA	[1] −59,200,000	
Dec. 18, 1958	From "Salaries and expenses, ARPA" to "Construction, ARPA"	−1,892,000	+1,892,000
Jan. 8, 1959	do	−299,000	+299,000
	Total [2]	399,742,000	12,018,000

[1] In addition to this amount, ARPA programs pertaining to certain development, meteorology, manned satellite and scientific space investigations with estimated obligations, fiscal year 1959, of $55.8 million, will be assumed by NASA in fiscal year 1960.

[2] As in President's budget, fiscal year 1959.

EFFECT OF NASA PROGRAM ON ARPA

Mr. FORD. Other than these transfers made by the Defense Department to NASA, does NASA call on you for any work which burdens your own funding?

Mr. JOHNSON. No; they have not. I think the contrary could very well be true as time goes on in the next 12 months, that we could call on them to do some scientific exploration which would burden their funds. The reverse of this is quite unlikely.

Mr. FORD. Are the activities of NASA thus far inhibiting or restricting your work in ARPA, referring to the military side of this effort?

Mr. JOHNSON. I would have to say honestly at this point the answer is "No," but I have said this several times before in this testimony—I am eternally vigilant to be on guard that the programs which they are authorized to do in our funding which are of interest to us be pursued to the maximum funding we think should be, and in the event there is a slowdown in the timetable or in priorities or in funding we will alert the Secretary and attempt to get corrective action.

At this point, though, I cannot say that there is anything in the transfer or in their activities which is impeding our effort.

Mr. FORD. I do not know from memory what their budget request is for 1960. Would you know?

Mr. JOHNSON. The budget here is $333 million for "Research and development" for space, which is separate from their in-house aeronautics activity, and that compares with our request for $307 million.

Mr. FORD. In space?

Mr. JOHNSON. Military space, $307 million.

Mr. FORD. $640 million between the two agencies for space, then?

Mr. JOHNSON. That is right.

ADEQUACY OF BUDGET

Mr. FORD. You have not created the impression that your budget request was inadequate for fiscal 1960 outside of the fact that you implied you may request some emergency funds, but you could not justify that at the present time.

What is your reaction?

Mr. JOHNSON. My feeling is that we could spend more money, yes, but today I could not do it on the kind of a program basis which good financial people would accept.

I am quite willing, due to my experience in the past year, to rely entirely on the emergency fund and the possibility of asking for supplementals to step up the programs as they need to be.

We have received within the last month some $32 million from the emergency fund.

I have every reason to believe that through reprograming, within approved programs, we can get money that we need.

There is, in the Department of Defense, I think, a very definite realization that this environment must be used in many new ways, and there is a willingness to reprogram. I rely on this to bail me out.

If it does not, I will be the first one to come up for a supplemental appropriation next year.

Mr. FORD. You would be perfectly willing to indicate your desire to this committee or to any other group if you felt you needed more money for special programs?

Mr. JOHNSON. That is right. I think I have been very forthright in this area. There is nothing to inhibit me from so doing.

Mr. FORD. Thank you very much.

Mr. MINSHALL. I have no questions, Mr. Chairman.

Mr. WEAVER. I have no questions, Mr. Chairman.

Mr. ANDREWS. This request before us from Secretary Quarles is for $5.6 billion for research and development.

Following you we will have the Air Force R. & D. budget presentation.

I notice it is——

Mr. JOHNSON. A little over $1 billion.

Mr. ANDREWS. $1.148 billion. That billion-plus is part of this $5.6 billion?

Mr. JOHNSON. That is right.

U.S. PROGRAM COMPARED WITH SOVIET

Mr. MINSHALL. This morning we discussed at some length a comparison of our research programs and the development of them with the programs of the Russians.

To your knowledge, based on the overall capacity of this country, would you say at the present time we were ahead of the Russians, even with them, or behind them?

Mr. JOHNSON. I can speak from two viewpoints. I can speak as a member of the Department of Defense for the last 14 months and I can speak as an ex-member of industry, the General Electric Co., for 30 years, where our contacts with Russian technology were pretty good. I think we are ahead of Russian technology and Russian science.

Mr. MINSHALL. In all phases?

Mr. JOHNSON. I am talking of the broad spectrum.

However, in specialized fields, where they have chosen for their own reason, to move in narrow bands, they definitely are ahead.

In the field of chemistry, I do not think there is any question but what we are 10 years ahead, some very large number of years in elements of time.

I think in several other fields, basic materials, exotic materials, new materials, we are way ahead of them.

They have chosen in certain narrow bands, I think in some elements of physics, some elements of electronics, to move ahead.

In miniaturization in electronics they have done practically nothing, for example. They have had the program to build the biggest of many research laboratories and installations of a technical nature, but they stop with building one. They have not repeated this.

For example, they have one of the finest universities in the world in Moscow, but the No. 2 university is not in the same league at all.

They have one of the largest electrical generating plants in the world, and then they fall way down to third rate.

We are tempted many times to look at this No. 1 example of their technology and assume that the whole level in that field is equally good. I think personally we are misled by what we see and what we hear.

Of course, I say that and at the same time I would rather run scared than to be complacent.

Mr. MINSHALL. What is the reason for their being so far ahead of us in their rocketry or propulsion capacity?

Mr. JOHNSON. I think this was a simple decision made by a chief 15 years ago, to build a very, very big rocket.

If you talk to the people who left Peenemunde you realize there were plans among the German group to build clustered engines. This was true in 1942.

They inherited these plans and inherited some 3,000 technicians.

I believe they said, "All right, what is the biggest thing we can make," just as they said what is the biggest university we can build, the biggest powerplant, the biggest of anything.

They elected then to build the biggest rocket they could conceive of without necessarily having a purpose in mind. They did it and it paid off. It has paid off very big dividends.

(Discussion off the record.)

Mr. MINSHALL. I have nothing further.

Mr. WEAVER. Do you think the Russians are jumping from one rocket to another to improve them as we are in order for them to build up any kind of an arsenal?

Mr. JOHNSON. Off the record.

Mr. WEAVER. We speak of their having 200, 300, or 500. Do you think they have to go through the same process we are?

Mr. JOHNSON. Off the record.

(Discussion off the record.)

COMMENDATION

Mr. SHEPPARD. I will take this unto myself. I have been privileged some 18½ years to sit here and go through this transition. It has been highly interesting.

Of all the witnesses I have been privileged to hear before this committee, I have enjoyed and I have learned more of the field which you are in than I have learned heretofore. I want to compliment you on it.

You have been very expressive and you have had the faculty of reducing your comments down to a common denominator of a layman's understanding.

Mr. JOHNSON. Thank you, Mr. Chairman.

Mr. SHEPPARD. I mean that seriously.

You are excused.

WEDNESDAY, APRIL 15, 1959.

RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, AIR FORCE

WITNESSES

HON. RICHARD E. HORNER, ASSISTANT SECRETARY OF THE AIR FORCE (RESEARCH AND DEVELOPMENT)
LT. GEN. R. C. WILSON, DEPUTY CHIEF OF STAFF, DEVELOPMENT
LYLE S. GARLOCK, ASSISTANT SECRETARY OF THE AIR FORCE (FINANCIAL MANAGEMENT)
BRIG. GEN. R. J. FRIEDMAN, DIRECTOR OF BUDGET, COMPTROLLER
MAJ. GEN. B. J. WEBSTER, DIRECTOR OF PROGRAMS, DEPUTY CHIEF OF STAFF, PLANS AND PROGRAMS
MAJ. GEN. M. C. DEMLER, DIRECTOR OF RESEARCH AND DEVELOPMENT, DEPUTY CHIEF OF STAFF, DEVELOPMENT
COL. JAMES T. STEWART, ASSISTANT FOR DEVELOPMENT PROGRAMING, DEPUTY CHIEF OF STAFF, DEVELOPMENT
LEWIS C. MEYER, CHIEF, RESEARCH AND DEVELOPMENT DIVISION, DIRECTORATE OF BUDGET, COMPTROLLER
MAX GOLDEN, GENERAL COUNSEL, U.S. AIR FORCE

Program and financing

	1958 actual	1959 estimate	1960 estimate
Program by activities:			
Direct obligations:			
1. Military sciences	$119,233,453	$131,906,000	$145,048,000
2. Aircraft and related equipment	263,427,787	330,832,000	348,534,000
3. Missiles and related equipment	304,718,125	325,621,000	317,759,000
4. Military astronautics and related equipment	4,185,826	14,179,000	2,150,000
6. Ordnance, combat vehicles, and related equipment	14,140,393	7,913,000	14,844,000
7. Other equipment	139,262,435	146,168,000	202,883,000
8. Programwide management and support	78,401,072	72,201,148	71,242,000
Total direct obligations	923,369,091	1,028,820,148	1,102,100,000
Reimbursable obligations:			
1. Military sciences	235,500	21,000	
2. Aircraft and related equipment	30,000		
6. Ordnance, combat vehicles, and related equipment	500,000		
7. Other equipment	15,000		
8. Programwide management and support	4,252,030	14,201,218	13,800,000
Total reimbursable obligations	5,032,530	14,222,218	13,800,000
Total obligations	928,401,621	1,043,042,366	1,115,900,000
Financing:			
Comparative transfers from (−) other accounts	−204,299,000	−271,208,000	
Unobligated balance brought forward	−76,600,240	−72,672,149	−55,000,000
Unobligated balance transferred from "Aircraft missiles and related procurement, Air Force" (1960 appropriation act)			−10,000,000
Unobligated balance (anticipated reimbursements to be earned from military assistance fund reservations) transferred from (−) or to other accounts	−217,206	1	
Advances and reimbursements from—			
Other accounts	−3,520,398	−12,305,557	−10,371,648
Non-Federal sources	−1,294,926	−1,916,661	−3,428,352
Unobligated balance carried forward	72,672,149	55,000,000	112,800,000
New obligational authority	715,142,000	739,940,000	1,149,900,000
New obligational authority:			
Appropriation	691,000,000	743,000,000	1,149,900,000
Transferred from "Emergency fund, Department of Defense" (71 Stat. 313 as amended by 72 Stat. 7; 72 Stat. 713)	29,435,000		
Transferred to—			
"Research and development," National Aeronautics and Space Administration (72 Stat. 433)		−12,700,000	
"Expenses," Airways Modernization Board (31 U.S.C. 581c)	−5,293,000		
"Salaries and expenses, Advanced Research Projects Agency, Department of Defense" (72 Stat. 712)		−170,000	
Appropriation (adjusted)	715,142,000	730,130,000	1,149,900,000
Proposed supplemental due to pay increases		9,810,000	

Object classification

	1958 actual	1959 estimate	1960 estimate
RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, AIR FORCE			
Total number of permanent positions	24,685	22,633	22,741
Full-time equivalent of all other postions	15	30	35
Average number of all employees	22,756	22,341	21,952
Number of employees at end of year	22,505	21,915	21,876
Average GS grade and salary	7.4 $5,629	7.6 $6,360	7.6 $6,410
Average salary of ungraded positions	$5,455	$5,668	$5,890
01 Personal services:			
Permanent positions	$130,720,780	$135,707,903	$135,600,288
Positions other than permanent	152,128	225,746	272,785
Other personal services	2,799,541	3,648,476	4,188,927
Total personal services	133,672,449	139,582,125	140,062,000
Direct obligations:			
01 Personal services	133,253,339	139,078,009	139,559,000
02 Travel	6,044,798	7,875,088	8,784,000
03 Transportation of things	2,173,400	5,905,682	5,966,000
04 Communication services	1,985,589	2,205,890	2,237,000
05 Rents and utility services	10,244,285	13,213,791	16,217,000
06 Printing and reproduction	586,191	707,088	812,000
07 Other contractual services	475,614,476	552,396,411	636,383,000
Services performed by other agencies	49,936,198	46,792,384	40,800,000
08 Supplies and materials	51,701,257	52,911,734	51,455,000
09 Equipment	183,497,386	198,830,311	189,694,000
10 Lands and structures			1,250,000
11 Grants, subsidies, and contributions	8,003,347	8,566,643	8,626,000
13 Refunds, awards, and indemnities	329,440	304,000	333,000
15 Taxes and assessments	55,315	41,360	56,000
Subtotal	923,425,021	1,028,828,391	1,102,172,000
Deduct quarters and subsistence charges	68,307	71,318	72,000
Total direct obligations	923,356,714	1,028,757,073	1,102,100,000
Reimbursable obligations:			
01 Personal services	419,110	557,116	556,000
02 Travel	215,918	233,912	184,000
03 Transportation of things	49,632	39,618	11,000
04 Communication services	732,411	744,110	801,000
05 Rents and utility services	699,516	1,508,209	1,736,000
06 Printing and reproduction	6,124	10,000	10,000
07 Other contractual services	1,265,210	2,187,975	2,366,000
Services performed by other agencies	119,802	207,616	200,000
08 Supplies and materials	1,343,912	8,169,510	7,476,000
09 Equipment	174,881	558,152	454,000
15 Taxes and assessments	6,014	6,000	6,000
Total reimbursable obligations	5,032,530	14,222,218	13,800,000
Total, Air Force	928,389,244	1,042,979,291	1,115,900,000
ALLOCATION ACCOUNTS			
Average number of all employees	2	3	
Number of employees at end of year	0	3	
01 Personal services: Positions other than permanent [1]	$8,933	$26,504	
02 Travel	113	4,000	
03 Transportation of things	14		
04 Communication services	19		
07 Other contractual services	1,502	26,049	
08 Supplies and materials	925	4,853	
09 Equipment	414		
11 Grants, subsidies and contributions	457	1,669	
Total, allocation accounts	12,377	63,075	
Total obligations	928,401,621	1,043,042,366	$1,115,900,000
Obligations are distributed as follows:			
Air Force	928,389,244	1,042,979,291	1,115,900,000
Department of Commerce	10,755	62,544	
Library of Congress	1,622	531	

[1] Portion of salaries carried in schedules to be submitted by Department of Commerce.

Mr. SHEPPARD. We shall resume, gentlemen. The next program to be presented is "Research development, test, and evaluation, Air Force."

JUSTIFICATION OF THE ESTIMATE

Please place in the record at this point the appropriate pages of the justifications.

(The matter referred to follows:)

Summary of requirements by budget program

Title	1958 actual	1959 estimate	1960 estimate
Military sciences	$139,530,115	$105,430,000	$145,048,000
Aircraft and related equipment	300,623,203	323,880,000	374,853,000
Missiles and related equipment	271,402,002	295,071,000	330,859,000
Military astronautics and related equipment	59,092,414	8,681,000	2,150,000
Ordnance, combat vehicles and related equipment	13,444,127	15,138,000	14,984,000
Other equipment	226,501,559	323,543,000	215,283,000
Programwide management and support	77,779,574	89,531,218	90,523,000
Total program requirements	1,088,372,994	1,161,274,218	1,173,700,000
Less portion of program to be obligated in subsequent fiscal years	−193,253,211	−177,050,000	−112,800,000
Plus obligations incurred against prior year program funds	33,281,838	58,818,148	55,000,000
Total obligations	928,401,621	1,043,042,366	1,115,900,000

Military sciences

Program requirements:

Fiscal year 1960	$145,048,000
Fiscal year 1959	105,430,000
Fiscal year 1958	139,530,115

PART I. PURPOSE AND SCOPE

This program provides for studies of all types to acquire fundamental knowledge applicable to the solution of development problems or study of techniques and skills for which there will be a military requirement. These studies represent an extension of investigative findings and theories of a scientific or technical nature into practical applications. The program includes development of general materiel and components, physical, medical, engineering, biological, social, and military sciences. It also provides for expenses of operation and management of Air Force research, development, test, and evaluation facilities having a mission primarily identified with military sciences.

PART II. JUSTIFICATION OF FUNDS REQUESTED

The following tabulation reflects the comparison of fiscal year 1959 and fiscal year 1960 estimates by program structure:

	Fiscal year 1959 estimate	Fiscal year 1960 estimate
Strategic air warfare systems	$1,800,000	$750,000
Air defense air warfare systems	700,000	750,000
Tactical air warfare systems	1,367,000	750,000
Support systems	5,537,000	1,450,000
Operational support	2,218,000	6,537,000
Research support	0	1,750,000
Applied research	8,993,000	51,296,000
Basic research	54,560,000	49,500,000
Operation and management	30,256,000	32,265,000
Total	105,430,000	145,048,000

Aircraft and related equipment

Program requirements:

Fiscal year 1960	$374, 853, 000
Fiscal year 1959	323, 880, 000
Fiscal year 1958	300, 623, 000

PART I. PURPOSE AND SCOPE

This program provides for research, development, test and evaluation of aircraft systems and related aircraft equipment, including airframes, engines, armament, communications, navigation, bombing and fire control equipment, weapons, ground support, and other equipment identifiable with aircraft and related aircraft equipment. The program also provides for expenses of operation and management of Air Force research, development, test, and evaluation facilities having a mission primarily identified with aircraft and related equipment.

PART II. JUSTIFICATION OF FUNDS REQUESTED

The following tabulation reflects the comparison of fiscal year 1959 and fiscal year 1960 estimates by program structure:

	Fiscal year 1959 estimate	Fiscal year 1960 estimate
Strategic air warfare systems	$79, 060, 000	$85, 000, 000
Tactical air warfare systems	10, 460, 000	16, 600, 000
Support systems	30, 550, 000	45, 105, 000
Operational support	21, 170, 000	32, 710, 000
Research support	37, 693, 000	20, 135, 000
Applied research	71, 323, 000	99, 410, 000
Operation and management	73, 624, 000	75, 893, 000
Total	323, 880, 000	374, 853, 000

Missiles and related equipment

Program requirements:

Fiscal year 1960	$330, 859, 000
Fiscal year 1959	295, 071, 000
Fiscal year 1958	271, 402, 000

PART I. PURPOSE AND SCOPE

This program provides for research, development, test and evaluation of missile systems and related missile equipment, integral components and equipment identifiable with missiles, including air-to-air, surface-to-air, air-to-surface, surface-to-surface missiles, missile training and test vehicles, ground support and related missile equipment. The program also provides for expenses of operation and management of Air Force research, development, test and evaluation facilities having a mission primarily identified with missiles and related equipment.

PART II. JUSTIFICATION OF FUNDS REQUESTED

The following tabulation reflects the comparison of fiscal year 1959 and fiscal year 1960 estimates by program structure:

	Fiscal year 1959 estimate	Fiscal year 1960 estimate
Strategic air warfare systems	$73, 098, 000	$86, 500, 000
Air defense warfare systems	17, 100, 000	600, 000
Tactical air warfare systems	38, 020, 000	7, 100, 000
Research support	14, 900, 000	6, 184, 000
Applied research	0	72, 664, 000
Operation and management	151, 953, 000	157, 811, 000
Total	295, 071, 000	330, 859, 000

Military astronautics and related equipment

Program requirements:

Fiscal year 1960	$2, 150, 000
Fiscal year 1959	8, 681, 000
Fiscal year 1958	59, 092, 414

PART I. PURPOSE AND SCOPE

This program provides for research, development, test and evaluation of military astronautics systems and related equipment as identified with the Air Force mission, including integral components and equipment identifiable with military astronautics equipment, and ground support equipment related to military astronautics equipment.

PART II. JUSTIFICATION OF FUNDS REQUESTED

The following tabulation reflects the comparison of fiscal year 1959 and fiscal year 1960 estimates by program structure:

	Fiscal year 1959 estimate	Fiscal year 1960 estimate
Strategic air warfare systems	$7, 655, 000	0
Operational support	391, 000	0
Applied research	635, 000	$2, 150, 000
Total	8, 681, 000	2, 150, 000

Ordance, combat vehicles, and related equipment

Program requirements:

Fiscal year 1960	$14, 984, 000
Fiscal year 1959	15, 138, 000
Fiscal year 1958	13, 444, 127

PART I. PURPOSE AND SCOPE

This program provides for research, development, test, and evaluation of ordnance, combat, and support vehicles and related equipment, integral components and equipment identifiable with ordnance, combat and support vehicles, including weapons not identifiable with aircraft, missiles, military astronautics or other equipment, general and special purpose vehicles, ammunition and related ammunition components, biological, chemical, atomic, or radiological in character.

PART II. JUSTIFICATION OF FUNDS REQUESTED

The following tabulation reflects the comparison of fiscal year 1959 and fiscal year 1960 estimates by program structure:

	Fiscal year 1959 estimate	Fiscal year 1960 estimate
Operational support	$2, 820, 000	$1, 087, 000
Applied research	12, 318, 000	13, 897, 000
Total	15, 138, 000	14, 984, 000

Other equipment

Program requirements:

Fiscal year 1960	$215, 283, 000
Fiscal year 1959	323, 543, 000
Fiscal year 1958	226, 501, 559

PART I. PURPOSE AND SCOPE

This program provides for research, development, test, and evaluation of complete equipment other than that separately provided under other programs. Includes ground electronic systems, such items of other equipment as communica-

tions, materials handling, construction, training, shop and utilities, printing and reproduction, photographic, and organizational and personal equipment, and integral components and related equipment. The program also provides for expenses of operation and management of Air Force research, development, test and evaluation facilities having a mission primarily identified with other equipment.

PART II. JUSTIFICATION OF FUNDS REQUESTED

The following tabulation reflects the comparison of fiscal year 1959 and fiscal year 1960 funds by program structure:

	Fiscal year 1959 estimate	Fiscal year 1960 estimate
Air defense warfare systems	$117,562,000	$76,223,000
Tactical air warfare systems	2,359,000	3,600,000
Support systems	74,001,000	70,393,000
Operational support	44,241,000	2,927,000
Research support	10,854,000	9,808,000
Applied research	62,487,000	40,024,000
Operation and management	12,039,000	12,308,000
Total	323,543,000	215,283,000

Programwide management and support

Program requirements:

Fiscal year 1960	$90,523,000
Fiscal year 1959	89,531,218
Fiscal year 1958	77,779,574

PART I. PURPOSE AND SCOPE

This program provides for expenses of operation and management of Air Force research, development, test, and evaluation of facilities which support programwide activity and are not primarily identified with any other program. These funds provide for rehabilitation projects and projects for replacement or restoration of damaged or destroyed facilities supported under this program, and include manpower, materials and equipment, supplies and services required to manage and carry out research, development, test, and evaluation projects. Similar costs for facilities identified under other programs are provided under the respective programs.

PART II. JUSTIFICATION OF FUNDS REQUESTED

This program supports the operation and management of the Wright Air Development Center, Dayton, Ohio, and the 6590th Special Activity Squadron, Headquarters, Air Research and Development Command. This squadron administers such centrally controlled programs as EAM rental service and aviation fuel and oil for the various activities comprising that command. Operation and management of Headquarters, Air Research and Development Command, is not provided under this appropriation.

Justification of requirements in support of these two activities, together with those activities included under the other programs comprising the fiscal year 1960 estimate, is presented under the consolidated operation and management program, with supporting detail by individual activity in the installations analysis.

Operation and management

Program requirements:

Fiscal year 1960	$368,800,000
Fiscal year 1959	357,403,218
Fiscal year 1958	333,542,494

PART I. PURPOSE AND SCOPE

This program provides funds to cover the expenses of operation and management of Air Force research, development, test and evaluation facilities, as well as rehabilitation projects and projects for replacement or restoration of facilities damaged or destroyed. These funds provide the manpower, materials and equipment, supplies and services required to manage and carry out research,

development, test and evaluation projects. This program combines the amounts included under all of the programs comprising the "Research, development, test and evaluation" appropriation into a single program for the purpose of consolidated presentation and justification of funds requested. The distribution among the various programs is for budget presentation purposes only.

PART II. JUSTIFICATION OF FUNDS REQUESTED

Included in this program are funds for: (1) pay of civilian personnel employed in all research, development, test and evaluation activities, excluding those at Headquarters, Air Research and Development Command; (2) travel and per diem costs for civilian and military personnel on official business; (3) contractual services required for operation and management of facilities; and (4) locally financed procurement of supplies, materials, and equipment, including aviation fuel and oil. A major portion of the civilian personnel paid from this program represents highly specialized scientific and technical personnel who are employed in the performance of such major functions as: (1) monitoring all research and development contracts; (2) testing and evaluating newly developed complete weapon systems as well as components and supporting systems; and (3) investigating and correcting defects encountered on these items during their entire service life. These funds also support the operations of the Armed Services Technical Information Agency and the following research, development, test and evaluation activities:

Wright Air Development Center, Dayton, Ohio.
Rome Air Development Center, Rome, N.Y.
Cambridge Research Center, Cambridge, Mass.
Arnold Engineering Development Center, Tullahoma, Tenn.
Air Force Special Weapons Center, Albuquerque, N. Mex.
Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska
School of Aviation Medicine, Randolph Air Force Base, Tex.
Air Proving Ground Center, Eglin Air Force Base, Fla.
Air Force Flight Test Center, Edwards Air Force Base, Calif.
Air Force Missile Test Center, Patrick Air Force Base, Fla.
Air Force Missile Development Center, Holloman Air Force Base, N. Mex.

Summary of requirements by activity

	Fiscal year 1959, actual	Fiscal year 1959, estimated	Fiscal year 1960, estimated
Technical operations	$208, 981, 116	$224, 237, 218	$233, 345, 000
Materiel maintenance	22, 614, 375	24, 788, 000	24, 727, 000
Installation maintenance	34, 001, 911	38, 277, 000	40, 014, 000
Base services	46, 216, 014	47, 913, 000	48, 255, 000
Management operations	21, 729, 078	22, 188, 000	22, 459, 000
Total program requirements	333, 542, 494	357, 403, 218	368, 800, 000

Mr. SHEPPARD. We have the Honorable Richard E. Horner, Lieutenant General Wilson, and their staffs with us.

Which of you gentlemen will make the prepared presentation?

Mr. HORNER. General Wilson will make a prepared presentation, and then we would like to show about a 20-minute movie.

If it pleases the chairman and the committee, we would like to suggest that these two things be done consecutively.

Mr. SHEPPARD. In other words, keep the presentation in continuity.

You would like the statement presented and then the pictures?

Mr. HORNER. That is my suggestion.

Mr. SHEPPARD. Then we will pick up the interrogation.

You may proceed accordingly and we will not interrupt you.

Statement of Deputy Chief of Staff, Development Headquarters, U.S. Air Force

Brief biographical sketch: General Wilson was born in Centralia, Pa., July 11, 1905. He was commissioned from the U.S. Military Academy in 1928, and was graduated from the flying school at Kelly Field in 1929. He is a graduate of the Air Corps Engineering School and the Air Corps Tactical School. During his career General Wilson has been closely associated with research and development. Highlights of his service include assignments to the Manhattan District; Deputy Chief for Air of the Armed Forces Special Weapons Project; Assistant Deputy Chief of Staff, Operations, for Atomic Energy; Commandant of the Air War College; Commander of the Third Air Force in the United Kingdom; member of the Weapons Systems Evaluation Group; and wartime experience as the Chief of Staff of the 316th Bomb Wing, Okinawa. General Wilson has been awarded the Legion of Merit with two Oak Leaf clusters.

General Wilson. Mr. Chairman and members of the committee it is a pleasure to make my first appearance before this committee in support of an Air Force research and development program. Before discussing details of our fiscal year 1960 budget estimate, let me first highlight some of the research and development progress made during the past 12 months.

Many important milestones were reached on schedule in the ballistic missile programs. For example, there were successful ATLAS firings at its maximum range. Both the THOR and ATLAS missiles were used as workhorse platforms in the fast-expanding national space program. TITAN began its flight test phase. Accelerated development of the MINUTEMAN weapon system was initiated.

Recently, an air-to-surface missile with a ballistic trajectory was fired experimentally from a B–58 Hustler in supersonic flight. The potential value of this new strategic weapon is tremendous.

Satisfactory progress was made on both the 2,000-mile-per-hour B–70 Valkyrie strategic bomber and the F–108 long-range interceptor. The BOMARC air defense missile repeatedly demonstrated that it is a reliable and accurate weapon.

Basic and applied research efforts were intensified in many of the sciences. New knowledge and techniques were developed which should increase the effectiveness of future weapons.

Working relationships have been established with the Advanced Research Projects Agency and the National Aeronautics and Space Administration. We are participating actively in various space projects, the development of high-thrust rocket engines, biomedical aspects of space flight, and other scientific endeavors vital to the technological future of the Nation.

The steady progress made on all fronts is assurance to us of an effective research and development program. With your approval, we intend to pursue an aggressive, forward-looking program in fiscal year 1960.

CHANGES IN THE R. & D. APPROPRIATION STRUCTURE

In order that our request for $1,149.9 million may be considered in proper context, the impact of recent appropriation structure changes should be taken into account. In the past, research and development has received sizable support from other appropriations. This year, $409.9 million of that support has been included in the research and development appropriation. As a result, the fiscal year 1960

research, development, test, and evaluation appropriation appears to be much larger than in previous years. Actually, as indicated on this graph only a very modest increase is planned in comparison with fiscal years 1958 and 1959 when the latter two are computed on the same basis.

Here, the fiscal years 1958, 1959, and 1960 fund estimates are shown distributed by budget activity. The 1958 and 1959 figures have been adjusted to correspond with the new fiscal structure, thus permitting direct comparison.

(The graph referred to above was classified.)

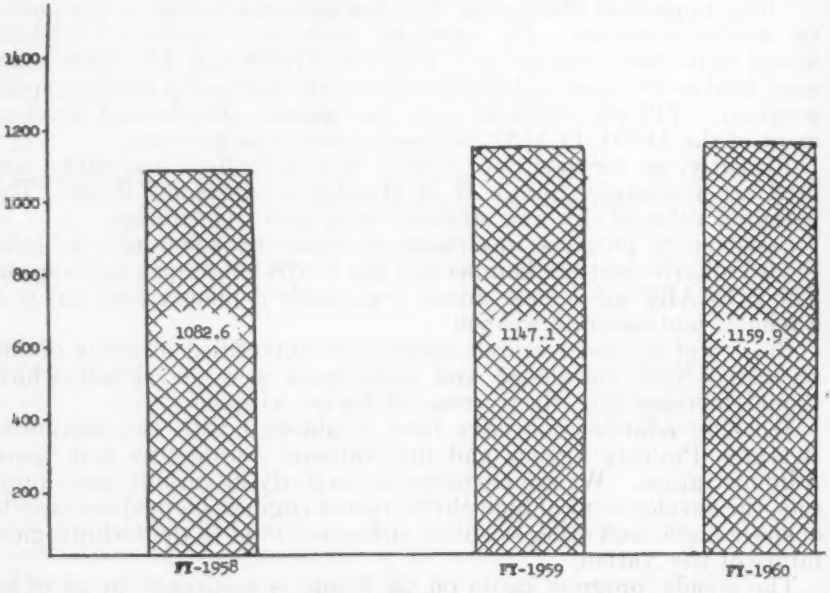
The total request for new obligational authority in fiscal year 1960 is $1,149.9 million. This new obligational authority, augmented by $10 million in recoupments, will finance the $1,159.9 million R. & D. program which I will discuss today.

(The graph referred to above follows:)

USAF RESEARCH, DEVELOPMENT, TEST, AND EVALUATION

FISCAL YEARS 1958, 1959, AND 1960

(Previous Years on Comparable Basis - In Millions)



There still remains significant R. & D. support in the procurement and production appropriations. Those funds are identified almost exclusively with aircraft, missile, and other weapon systems aimed at early production and inclusion in the operational inventory.

R.D.T. & E. MANAGEMENT STRUCTURE

With your permission, as in past years, I shall discusss dollar distribution on the basis of the Air Force R. & D. management program structure. In this arrangement, program elements are grouped into three major functional areas: a development program containing those weapon systems and equipments planned for the operational

inventory; a research program containing those projects aimed at increasing fundamental knowledge and proving technical feasibility; and a center operations program containing those dollar resources needed to operate and maintain our laboratories and test facilities.

The development program, being oriented to specific operational needs, is further subdivided into functional mission areas as follows:

USAF Research and Development Management Structure

1. Development program:
   A. Strategic weapon systems.
   B. Air defense weapon systems.
   C. Tactical weapon systems.
   D. Support systems.
   E. Operational support.
2. Research program:
   A. Research support.
   B. Applied research.
   C. Basic research.
3. Center operations.

The Strategic, Air Defense, and Tactical areas are self-explanatory.

Support systems are not in themselves weapons or combat vehicles, but rather perform a clearly defined function in support of an Air Force mission. An example is the Air Force communication system.

Operational support includes miscellaneous equipments not identified with any one system or mission. An aircraft runway arresting barrier is a typical example of work in this area.

The research program is subdivided into basic research, applied research, and research support. The latter area includes research vehicles, such as the X–15, and test instrumentation.

Now, returning to the major management structure elements, this graph compares dollar distributions for fiscal years 1958–60. Again, the figures for 1958–59 have been adjusted to permit direct comparison.

(The graph referred to above follows:)

USAF research, development, test, and evaluation, fiscal years 1958–60, by management structure

	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960
Development program	453.2	530.1	438.1
Research program	300.9	273.8	366.8
Center operations	328.5	343.2	355.0
Total	1,082.6	1,147.1	1,159.9

Your attention is invited to the increased emphasis on the research program. Also, note the $1,159.9 million total for fiscal year 1960; that sum is the amount shown on the earlier chart that presented dollar distribution by budget program area.

This next chart, which is classified, shows dollar distribution by the functional subdivision of the management structure. In the development program, the distribution of funds follows the priorities and urgencies of the strategic, air defense, and tactical missions. Also, your attention is invited again, in the research program, to the increased emphasis on applied research. The products in this latter area—for example, advanced missile guidance techniques—will be reflected in weapon systems of the very near future.

Before we examine the individual projects and items contained in the various management areas, let me show you one last background-information graph. Here is shown the translation of dollars from management structure to budget program areas. Note that the totals of the budget program areas horizontally add up to $1,159.9 million, as do the vertical management subdivisions. If the committee wishes, we can examine this chart in more detail later.

With this background in mind, let us now examine the major items in our program.

STRATEGIC SYSTEMS

Strategic weapon systems will receive the largest portion—$172.3 million—of the development program funds. This area remains large because of the continued urgency placed on both the ballistic missile programs and new air weapons for the manned strategic force.

(The following table was inserted later:)

USAF fiscal year 1960 R.D.T. & E. budget estimate

Strategic systems:	*Millions*
ATLAS-TITAN	$18.5
MINUTEMAN	20.0
Aircraft nuclear propulsion	75.0
B–70	10.0
Air-to-surface missile (ASM)	20.0
Antiradar missile (ARM)	23.0
Other	5.8
Total	172.3

$18.5 million is planned for the ATLAS and TITAN programs; $20 million is required for MINUTEMAN.

$75 million for aircraft nuclear propulsion development represents the Air Force share of this joint program with the Atomic Energy Commission. The X–211 General Electric direct cycle engine will require most of the aircraft nuclear propulsion money for 1960. However, funds also cover associated work on engine and reactor compatability, radiation effects, and safety analyses.

The $10 million for the B–70 VALKYRIE will allow continuation of design and development of the airframe, its major subsystems and supporting equipment, and advanced wind tunnel testing.

This weapon will increase significantly the flexibility and striking power of the strategic forces.

Another major project concerns the development of an antiradiation missile. This weapon, as its name indicates, is a positive electronic countermeasure. So that our manned bombers may better penetrate well-defended enemy territory for precision attacks against hardened targets, aids such as this will be used to destroy enemy detection and control equipments.

The area entitled "other" includes effort on more advanced penetration aids and planning studies of strategic systems.

AIR DEFENSE SYSTEMS

Next of prime concern in the air defense area is early warning of enemy attack and the ability to control simultaneously both our defensive and offensive weapons.

Our air defense effort of $77.6 million for fiscal year 1960 is in consonance with the urgency of this need; $22.5 million is going toward improvement and testing of advanced components and subsystems of the continental aircraft, control, and warning system.

(The following table was inserted later:)

USAF fiscal year 1960 R.D.T. & E. budget estimate

Air defense systems:	*Millions*
Continental A.C. & W	$22.5
Ballistic missile defense—phase I	15.0
Lincoln Laboratories	11.0
Air Defense Systems Integration Division (ADSID)	23.7
Other	5.4
Total	77.6

Fifteen million dollars is in support of the ballistic missile defense system. These funds will continue investigation in areas such as target acquisition, tracking, impact prediction, and interception.

The Lincoln Laboratories effort provides advanced air defense system studies, evolution of new technical concepts, feasibility studies of experimental prototype equipment, and exploratory research and development support for SAGE.

The recently activated Air Defense Systems Integration Division appears as an item in the R. & D. budget for the first time. As its name implies, this agency will coordinate the management and direction of all the highly complex air defense weapon systems to ensure an effective overall defensive capability. The funds requested will finance technical contracts in support of ADSID.

The area entitled "other" includes work on an aircraft control and warning system for theater operations, and advanced studies.

TACTICAL SYSTEMS

Twenty-eight million dollars is requested for development in the tactical weapon systems area.

(The table was inserted later:)

USAF fiscal year 1960 R.D.T. & E. budget estimate

Tactical systems:	*Millions*
Dispersed site fighter (FX–V/STOL)	$16.6
WHITE LANCE	6.5
Tactical air control system	3.6
Other	1.3
Total	28.0

First, the development of a dispersed site fighter should lessen the tactical dispersal problem, This new fighter aircraft will be capable of operating from very short runways, or, under certain conditions, taking off and landing vertically.

WHITE LANCE is a follow-on development to the Navy BULL PUP air-to-surface missile. The $6.5 million is for improved guidance, aircraft launchers, ground handling equipment, and warhead fuzing.

The tactical air control system funds will continue minimum development of mobile equipments for oversea theater use.

The "Other" category principally will be used for advanced tactical weapon system studies.

SUPPORT SYSTEMS

We have included $116.9 million for "Support systems," distributed as indicated on the chart.

USAF fiscal year 1960 R.D.T. & E. budget estimate

Support systems:	*Millions*
Intelligence data handling	$20.8
ELINT–COMINT	16.6
AF communication system	17.2
DYNASOAR	35.0
Weather observation and forecasting system	6.5
Weather reconnaissance system	7.6
Traffic control and landing	6.0
Strategic Air Command control system	3.3
Materiel handling system	2.5
Other	1.4
Total	116.9

The first two support systems pertain to intelligence data handling and electronic-communications intelligence. Both are pointed toward improved acquisition, analysis, and rapid communication and distribution of this vital information. The funds requested, $20.8 million and $16.6 million, will permit system integration engineering, purchase of service test items, component improvements, and subsystems test and evaluation.

The Air Force communication system is expected to provide highly reliable and effective global communication services in support of Air Force missions. The $17.2 million will improve, expand, and modernize the system through the development of new techniques and components.

DYNASOAR

The DYNASOAR funds will permit detail design and early development effort by a single contractor selected from the present dual competition. This work will lead toward the eventual fabrication and testing of experimental prototype vehicles.

Mr. SHEPPARD. Before you go into your next item, I want a little more explanation of the $35 million plus request involving DYNASOAR.

General WILSON. This is a vehicle which fills the gap between the X–15, which you understand is an atmospheric vehicle of very high speed—this greatly extends the speed range and the altitude of the X–15 up into the near orbital velocities. It adds the controllability feature and the ability to maneuver and the ability to land normally at preselected airdromes. Our feeling is that this is an area of the upper atmosphere which needs further exploration, and it also is a step toward space vehicles if, as, and when these come about.

It is not our purpose to develop this as a weapon system. This is a prototype, a development to explore this area of aerospace.

Mr. SHEPPARD. You referred to two firms that I assume are competitors in this field. Is that predicated on the premise of past experience or what prompted the concentration in two instead of considering three or four systems?

General WILSON. This is in the early study stage, and our experience has indicated that certainly we should have more than one

source. I would have to ask Mr. Horner if he knows why we did not go to more than two sources, if that is your questions, sir.

Mr. HORNER. At one time in the early studies, we had many more than two sources studying this problem. We came to a point in the study program where we felt that we could identify two possible fruitful solutions. We were afraid, with the knowledge that was available at that time, to select either one of them, so we selected two contractors to go to the point of mockup of major components before making a final selection of a single one. The only reason we did not select more is that we did not feel that the payoff was appropriate to the amount of money required.

Mr. SHEPPARD. So by the procedure of elimination, you arrived at two.

Mr. HORNER. That is correct.

Mr. SHEPPARD. At this time, have you arrived at one?

Mr. HORNER. No, sir; we have not.

Mr. SHEPPARD. Why have you not?

Mr. HORNER. We are in process of arriving at one, and the reason we have not as yet is that the work has not reached that stage.

Mr. SHEPPARD. Upon what premise do you arrive at that amount of money?

Mr. HORNER. We will arrive at one before that money is spent.

Mr. SHEPPARD. You come up here with a figure of $35 million. If you have not definitized the firm with which you will do business, upon what premise did you reach the $35 million estimate?

Mr. HORNER. On the basis of estimates from both of the firms. Our present schedule calls for elimination of one of the two active firms during the last months of this fiscal year, either May or June.

Mr. SHEPPARD. If you get this money, when would you reach a contract with the firm that you yourself select?

Mr. HORNER. Very early in the next fiscal year, hopefully July or August.

Mr. SHEPPARD. I assume this would be defined as an open end contract, is that correct?

Mr. HORNER. The contract will be based upon the statement to produce definitive work costing this amount of money on an estimate basis.

Mr. SHEPPARD. You do not contemplate offering a contract for this period, do you?

Mr. HORNER. No, sir.

Mr. SHEPPARD. In the first place, you have defined the fact that you will select a firm, whichever it may be, to do this job. The $35 million will go how far? As far as the production of one for the purpose of evaluation and testing, or further than that?

Mr. HORNER. It will cover only one fiscal year's period of work.

Mr. SHEPPARD. Is it to be assumed here that, having selected a firm which would prove its capability to produce the first unit, you would be justified then in continuing what is commonly known in the Congress as an open end contract, or would you come to a more definitized concept at that time?

Mr. HORNER. We would definitize the contract and the work statement as time went on, on the basis of experimentation and study conducted by the successful contractor from this source selection.

Mr. SHEPPARD. Has either one of the two firms that you have referred to—and you have studiously avoided mentioning them, which is your privilege at the moment—had experience in the field of aerodynamics that you are seeking here?

Mr. HORNER. Mr. Chairman, there is no reason to withhold from the committee the names of the two firms involved. They are actually two teams of firms. They are led on the one hand by Boeing Aircraft Co., and on the other hand by Martin and Bell Aircraft Cos.

Mr. SHEPPARD. In other words, those would be the two firms that would have the prime contractor position, even though they would be operating with other firms.

Mr. HORNER. That is correct.

Mr. SHEPPARD. Who would be the subcontracting firms, as long as you have mentioned the primes.

Mr. HORNER. I am sorry, sir, I shall have to provide that information to the committee. I cannot recall them offhand. There is quite a number of firms in each team. I would like to provide that to the committee, if you wish it.

(The information requested follows:)

SUBCONTRACTOR FOR DYNASOAR

I. PRIME CONTRACTOR

The Martin Co., Baltimore Division, system integration.

Subcontractors

1. The Bell Aircraft Corp., Buffalo, N.Y.: Airframe, airframe subsystems (except hydraulic and electrical), flight control.
2. American Machine & Foundry Corp.: Heavy ground handling and launching equipment.
3. Bendix Aviation Corp.: Hydraulic and electrical subsystems; telemetry, and short-range communication systems.
4. Goodyear Aircraft Corp.: Pilot escape system; radar studies.
5. Minneapolis-Honeywell Regulator Co.: Aircraft navigation system; inertial guidance and computer studies.
6. The Martin Co., Denver Division: Boosters.

II. PRIME CONTRACTOR

The Boeing Airplane Co., Seattle, Wash.: Flight vehicle and ground support.

Subcontractors

1. General Eelectric: Guidance and tracking system, including airborne components.
2. North American Aviation, Autonetics Division: Inertial guidance and flight control.
3. Chance-Vought: Flight capsule including escape.
4. Sundstrand Aviation Division, secondary power.
5. RCA:

(*a*) (Second tier subcontractor not selected). Air-ground communication subsystem.

(*b*) (Second tier subcontractor not selected.) Ground communications.

6. Convair or Martin: Boosters.
7. Hercules Powder Co.: Separation rockets.
8. Ramo-Wooldridge, RCA: System studies.
9. Goodyear Aircraft Corp.: Navigation system studies.

Mr. SHEPPARD. What is the contemplated speed of DYNASOAR as you have projected it at this time?

Mr. HORNER. The capability of the DYNASOAR vehicle will go from, of course, subsonic speeds at launch and at low altitudes, up to about 17,500 m.p.h.

Mr. SHEPPARD. How does it happen this does not fall within the ARPA function, now that ARPA is the operational authority in this field?

Mr. HORNER. We have discussed the DYNASOAR program, of course, both with ARPA and with the National Aeronautics and Space Administration. It is a rather difficult determination because this machine operates on the fringes of the atmosphere. We have a written understanding from both ARPA and NASA, and we have a very closely coordinated technical program. The determination was made to leave it as a contractual and operational responsibility of the Air Force; partly, at least, on the basis that it was suborbital in speed.

Mr. SHEPPARD. Taking that position for granted, and I am not quarreling with that position, what is the corelationship during the development of this particular operation with ARPA? Is there liaison between the two, or is it a fact that this has been assigned directly to the Air Force and we will re-review it at the time of its completion when it is perhaps ready for testing.

Mr. HORNER. Of course, this program, like all of ARPA's programs, is reviewed by the Director of Defense Research and Engineering, Dr. York, and he is free to make a new determination at any time as regards the assignment of responsibility.

Mr. SHEPPARD. Then there is a continuity of liaison between the functions.

Mr. HORNER. Yes, sir.

General WILSON. This also extends to the NASA, sir. They have people also in the project.

Mr. SHEPPARD. Proceed with the statement which you started when I interrupted you.

WEATHER OBSERVATION AND FORECASTING SYSTEM

General WILSON. The weather observation and forecasting system is being developed to improve our capability in these functions. It will provide advanced weather data handling, observation methods, and processing and display techniques. The $6.5 million will initiate procurement of dissemination and display equipment to start an experimental network of weather stations.

Other support systems cover weather reconnaissance, a mobile traffic control and landing aid for overseas use, modernized control for the Strategic Air Command, materiel handling, and advanced studies.

Mr. SHEPPARD. What is the relationship between this weather forecasting system and that of the Weather Bureau?

General WILSON. This is a project which was undertaken by the Air Force. There are Weather Bureau personnel acting as liaison officers in this area, just as there are Federal Aviation Agency personnel acting in the area. At the moment the whole project is being supported by Air Force funds. There is a possibility that these other agencies may be able to help us fundwise, in which event we would expect to see this figure go down slightly.

Mr. SHEPPARD. Have you reviewed the budget to justify your assumption?

General WILSON. Sir, I am only expressing a hope.

Mr. SHEPPARD. I appreciate that statement.

Mr. SIKES. I would like to have more information on the necessity for the Air Force weather forecasting system in addition to the weather forecasting carried on by the Weather Bureau.

Mr. SHEPPARD. The gentleman may explain that.

General WILSON. The Air Force has always taken leadership in this area, sir. Our interest stems from supplying the combat forces with proper weather information. This is particularly important overseas. It becomes less clear back home. Still, to develop one we developed the other. Throughout the whole period, we have had leadership in this area.

Mr. SHEPPARD. This is a worldwide operation?

General WILSON. Yes, sir.

Mr. SHEPPARD. Proceed with your statement.

OPERATIONAL SUPPORT

General WILSON. The $43.3 million requested for the operational support area provides funds for a wide variety of items.

(The following table was inserted later:)

USAF fiscal year 1960 RDT & E budget estimate

Operational support:	*Millions*
Electromagnetic warfare	$20.4
Navigation and guidance	8.3
Flight control	3.8
Protection and sustenance of personnel	1.1
Human performance	1.8
Others	7.9
Total	43.3

As indicated by the dollar totals, emphasis is concentrated in the following areas: Electronic countermeasure and ferret equipment; navigation and guidance systems; new flight control systems, indicators, gages, and the like. The areas of protection and sustenance of personnel and of human performance, although small in relative dollar costs, include many projects. Examples are pressure suits, flash blindness protectors, helmets, and inflight feeding equipment.

Items such as practice bombs, tow targets, and cargo handling equipment are funded in the category labeled "other."

NAVIGATION AND GUIDANCE SYSTEMS

Mr. SHEPPARD. What is the relationship between the navigation and guidance operation to the tune of $8.3 million, and the U.S. Navy programs, in this particular field? I am addressing myself to that at the moment exclusively.

Mr. HORNER. You mean similar work the Navy is doing?

Mr. SHEPPARD. Yes. I am asking what the correlation is in those functions, if there is any.

General WILSON. There is.

Mr. HORNER. Yes, sir, there is. The Navy is doing work in this area in connection with their airborne operations. The techniques are quite different for seaborne operations. We have a very closely coordinated program through the Director of Defense Research and Engineering in this area, a committee which meets and coordinates

the program to assure that there is no duplication, that there is value obtained by both services from both programs.

Mr. SHEPPARD. In other words, there is close liaison between the two so one can obtain benefit from the work of the other.

Mr. HORNER. Yes, sir.

Mr. OSTERTAG. Mr. Secretary, the amount of $8.3 million, for navigation and guidance does not reflect the total amount of money that is going into research and development in this particular field, does it?

Mr. HORNER. No, sir, it does not.

Mr. SHEPPARD. This is only their portion of it, as I interpret the situation. Is that not correct? This is the Air Force portion of the contribution to the total.

Mr. HORNER. You will also find, Mr. Chairman, other money in the Air Force research and development program in other categories, doing work in some respects in navigation hardware, for example.

Mr. SHEPPARD. So the figure of $8.3 million is not the total figure which has to do with expenditures in this field.

Mr. HORNER. No, sir.

Mr. SHEPPARD. There are others coming along later.

Mr. HORNER. Yes, sir.

Mr. SHEPPARD. And we will get to them as we go through the presentation.

Mr. HORNER. That is correct.

General WILSON. This represents development hardware. There is basic research and applied research to back it up.

RESEARCH PROGRAM

The research program may be the most significant of all our efforts. It is the key to our future technological capability.

Through the efforts expended in attempting to understand the unknown, and in the search for new ideas and techniques, we build up and maintain a stockpile of fundamental knowledge. The technical know-how to build the weapon systems that comprise our combat force is drawn from this reservoir. If we should allow it to be depleted, we would be penalized most severely. Either our combat weapons would be inferior, or inefficiencies and delays would result that increase the time and cost of developing new systems.

As indicated on this chart, $366.8 million is requested for the overall research program.

(The chart referred to follows:)

USAF fiscal year 1960 budget estimate, RDT & E

Research program:	*Millions*
Basic research	$49.5
Applied research	279.4
Research support	37.9
Total	$366.8

BASIC RESEARCH

The determination and understanding of basic facts of natural phenomena are the very foundation of all technological progress. Our basic research program includes $49.5 million to seek out this

kind of knowledge. The program is divided into seven functional areas: Propulsion, materials, electronics, geophysics, biosciences, aeromechanics, and military sciences.

Let me cite two examples of the hundreds of basic research efforts planned for fiscal year 1960. The first is solid state properties of matter. Here, the purpose is to better understand the nature of imperfections in solids, interactions between them, and the resultant physical properties and their effect on Air Force weapon system materials.

The second example is research in electro-magnetic energy transfer. The purpose of this work is to increase our knowledge in general electronic sciences, extreme frequency generation, combined electronic and magnetic field effects and extra-terrestrial and molecular phenomena.

Results in these areas might lead to new concepts in military electronic and communication systems. For example, new detection methods, based on wave propagation and radiation, may emerge, as well as new techniques for communications in the upper atmosphere and higher regions.

APPLIED RESEARCH

The area of applied research contains those efforts most relevant to our current technological status. Therein, we convert theory and knowledge into proven concepts and techniques, or physical demonstrations in terms of functioning hardware, that enable the efficient development of advanced future combat weapons.

The $279.4 million requested will finance several thousand contracts with industry, and scientific and educational institutions.

A representative example of applied research is the continuing work on advanced guidance systems. The North American N5B lightweight inertial autonavigator is a product of these efforts. Prototype components and subsystems, such as free-rotor gyroscopes and digital computers, are tested on the 30,000-foot track at Holloman to prove out the feasibility of using them in high-acceleration environments.

The breadboard models tested over the past year have verified the potential and capabilities of the N5B sufficiently that this guidance system has been ordered into production for the HOUND DOG missile. A more advanced version, components of which are being tested now, has tentatively been selected for MINUTEMAN.

Another example pertains to electronic techniques. The Westinghouse Electric Corp. recently discovered a means of high-speed crystal growth. When coupled with other known processing techniques, practical application can be made of the vast store of molecular knowledge accumulated over the past 15 to 20 years. The Westinghouse breakthrough—which is proprietary—reduces the number of component parts of an electronic equipment by literally growing solid state materials into functional electronic components. Using this technique, the weights and sizes of transistorized printed circuit equipment may be reduced by a factor of 10. Power consumption will be in terms of watts instead of kilowatts. We have begun feasibility experiments on prototype components.

Still another example is in the materials area. As you know, structural problems arise from many causes. Two of these factors are extremes of temperature and weight reduction requirements. New

solutions are being sought in the areas of pressure metallurgy, vacuum melting, beryllium alloys, refractory metals, and graphite.

One of the intriguing new materials is beryllium. It is lighter than magnesium, has a melting point twice that of aluminum, and a stiffness factor exceeding that of stainless steel. A missile nose cone of beryllium might weigh 13 pounds; a comparable copper cone weighs approximately 100 pounds * * * I have with me a sample beryllium gear for your later examination.

I would like to warn you that beryllium is poisonous, and if you have scratches on your fingers, you should be careful how you handle it.

Mr. SHEPPARD. May I say to the gentleman, you keep it over there, and I will look at it from here. I have been associated with that in the past, and I do not care for more of it.

Mr. OSTERTAG. May I ask the General, before you go into research support, you have just covered the basic research program and then the applied research. Is it correct to say that the $49.5 million is necessary to establish the scientific background essential for expenditure of the amount of $279 million in applied research? Is that the general picture of the difference between basic and applied research?

General WILSON. As a rule, sir, basic research is less expensive than applied, because we are buying brains here, for the most part.

Mr. OSTERTAG. That is right. In other words, it is the scientific aspect which has not reached the point of actually putting it into something material.

General WILSON. Yes, sir; that is correct.

Mr. SHEPPARD. I think that is indicated by the figures.

Proceed with your statement.

RESEARCH SUPPORT

General WILSON. The research support area, as previously stated, includes research vehicles, and the development of test techniques and instrumentation equipments.

The most complex and costly research vehicles is the X–15. The cost of this project in fiscal year 1960 is estimated at $14.9 million. The formal roll-out of the first vehicle was accomplished on schedule last October. Captive flights aboard a carrier B–52 have begun. First powered flights should begin soon. Ultimately, flights will investigate the problems encountered in hypersonic flight at speeds above 3,600 m.p.h. and altitudes above 100 miles. The funds requested will allow completion of the third aircraft and further engine development.

Seven million dollars is planned to cover completion costs for the Hiller-Tilt Wing vertical takeoff aircraft, continue feasibility investigation of the AVRO vertical takeoff air vehicle, and provide test rockets for exploring the upper atmosphere.

Mr. SHEPPARD. Do you later depict the types of jobs that you are presently referring to? Will that be shown in graphs so we can take a look at them, or not?

General WILSON. We can obtain those for you, sir, if they do not actually show up in the film. We can get you pictures of them.

The remaining $16 million in the research support area will be used for test and instrumentation development purposes. Requirements

for these research aids are extensive, varied, and unique. They include, for example, parachute devices and optical, photographic, and electronic data recording equipments. The expense of missile and advanced vehicles makes it essential that we obtain maximum data from each flight or test operation. Therefore, our efforts are directed toward devising more efficient means of sensing, measuring, recording, and analyzing test results.

Center Operations

Last, center operations funds provide for the maintenance and operation of the laboratories and test facilities, for testing and evaluating weapon systems and equipments, for the administration of contracts, and for engineering services associated with the force-in-being. With the exception of the pay of military personnel, these funds cover all operating costs of the nine major research, development, test, and evaluation centers, and several smaller installations and activities.

This map shows the location of our principal installations. The Cambridge Research Center is the principal point of our geophysics and electromagnetic investigations.

(The installations referred to follows:)

Air Force Research, Development, and Test Installations

Wright Air Development Center, Dayton, Ohio.
Rome Air Development Center, Rome, N.Y.
Cambridge Research Center, Cambridge, Mass.
Arnold Engineering Development Center, Tullahoma, Tenn.
Air Force Special Weapons Center, Albuquerque, N. Mex.
Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska.
School of Aviation Medicine, Randolph Air Force Base, Tex.
Air Proving Ground Center, Eglin Air Force Base, Fla.
Air Force Flight Test Center, Edwards Air Force Base, Calif.
Air Force Missile Test Center, Patrick Air Force Base, Fla.
Air Force Missile Development Center, Holloman Air Force Base, N. Mex.
Armed Services Technical Information Agency, Arlington, Va.
Air Defense Systems Integration Division, Bedford, Mass.
Air Force Ballistic Missile Division, Inglewood, Calif.
Air Research and Development Command, Andrews Air Force Base, Washington, D.C.

You are familiar with the activities of the Atlantic Missile Range in the testing of missiles. The Air Proving Ground Center's primary mission areas are systems engineering and operational evaluations of weapon systems and equipments.

The Arnold Engineering Development Center performs aerodynamic tests and environmental propulsion tests. The Rome Air Development Center specializes in intelligence devices, ground electronic equipments, and electromagnetic warfare. The Wright Air Development Center is the home of laboratories as well as our weapon system project offices.

The Air Force Missile Development Center conducts short range missile tests, guidance system tests, and biodynamic tests. The Spec-

ial Weapons Center tests weapons, evaluates nuclear effects, and provides field support to the Atomic Energy Commission. The Air Force Flight Test Center tests all new aircraft as well as rocket engines.

Also shown here are the Air Defense Systems Integration Division, ARDC Headquarters, and the Ballistic Missile Division. They all are funded in the Operations and maintenance appropriation as part of a major command headquarters.

The Office of Scientific Research, which manages our basic research program, is funded from the R. & D. appropriation, as is part of the activities of the School of Aviation Medicine.

Not shown are lesser installations such as the icing research facility in New Hampshire, an experimental track in Utah, and a parachute testing facility at El Centro, Calif.

The $355 million requested for center operations is presented on this chart in five major functional areas.

(The chart referred to follows:)

USAF fiscal year 1960 R.D.T. & E. budget estimate

Center operations:	*Millions*
Civilian personnel	$ 139.6
Contractor operated installations	100.7
Supplies and equipment	55.4
Travel, transportation of things, and utilities	23.4
Contract technical services, EAM rentals, maintenance of real property, and equipment	35.9
Total	355.0

The largest single item is pay of civilian personnel; $139.6 million will provide 22,741 positions to perform housekeeping, aircraft maintenance, guards, and firefighting, as well as the scientific and technical functions at our centers.

Mr. OSTERTAG. Mr. Chairman, are we to understand that this personnel item is not covered in the Air Force appropriation under personnel?

General FRIEDMAN. Sir, these are civilian personnel that General Wilson is speaking of here, and normally——

Mr. OSTERTAG. It comes under the research and development appropriation?

General FRIEDMAN. That is correct, sir, for those people involved in research and development operations. The bulk of the remainder are funded in the O. & M., Air Force, appropriation.

(Off the record.)

CONTRACTOR-OPERATED INSTALLATIONS

General WILSON. The second largest item, "Contractor-operated installations," covers the cost of contract operation of the Atlantic Missile Test Range, the Arnold Engineering Development Center at Tullahoma, Tenn., and several facilities of lesser magnitude. Of the $100.7 million shown, the two contracts mentioned require approxi-

mately $90 million. The major portion of all these contracts pays the salaries of the technical personnel who maintain and operate the expensive and complicated test equipment used.

Mr. SHEPPARD. Before you go further, let me ask you something about this. What type of contract are you issuing in this function? Spell it out for us, as you go, on the record.

General WILSON. This is a contract for operation and management, to include the services of the technical personnel necessary to operate the ranges, in the case specifically of Canaveral.

Mr. SHEPPARD. This is literally a management contract as such?

General WILSON. A management and service contract, yes.

Mr. SHEPPARD. Is the contract you referred to in the first instance when you started discussing this, parallel to all the other contracts? Are they similar insofar as management contracts are concerned, within the basic language of the contract?

General WILSON. So far as I know, this is true. Have we an expert on contracts?

Colonel STEWART. These are both management and operations contracts that we refer to here. I think you have to call them more operating contracts than management contracts. When you think of a management contract, you think of our work with the Space Technology Laboratory, which probably General Schriever described last week.

Mr. SHEPPARD. We have one which is complete management and one which is split. Here you have a split because you have operation and management as well.

Colonel STEWART. Yes, sir.

Mr. SHEPPARD. My question was directed to contracts of parallel character, meaning by that management and operational. Are those contracts parallel in their provisions, with a price factor deviation? I know you cannot write every contract dollarwise the same. But is the general language incorporated for the services you expect from these people parallel, one with the other, or do you write specific contracts covering each contract which is issued?

Mr. HORNER. They differ significantly only in the work statement, Mr. Chairman. There is a work statement in each contract which delineates, in some detail, the work which is expected from the contractor. The basic contract is almost the same in each case.

PAN AMERICAN CONTRACT TO OPERATE THE ATLANTIC MISSILE RANGE

Mr. SHEPPARD. What is the largest contract you have in the Air Force covering both management and operation? Which one is the largest, dollarwise?

Mr. HORNER. The one with Pan American to operate the Atlantic Missile Range.

Mr. SHEPPARD. That is strictly operational, is it not?

Mr. HORNER. It is operational. They also provide services and some management.

Mr. SHEPPARD. Do you have a contract there which is confined to management and operation exclusively?

Mr. HORNER. No, sir; I do not believe so.

Mr. SHEPPARD. In that circumstance, I wish you would supply the committee a copy of the contract you have with Pan American for the committee's purpose but not for the record.

Mr. HORNER. All right, sir.

Mr. ANDREWS. May I ask a question, Mr. Chairman? How will Vandenberg be operated, by the Air Force or by contract?

Mr. HORNER. Vandenberg is an operational and training base, and it will be operated by the Air Force.

Mr. ANDREWS. How long has Pan American had the contract to operate the Atlantic Missile Range?

Mr. HORNER. I believe it is fiscal year 1954. I would like to check that.

Mr. ANDREWS. How many employees do they have, and what do you pay under the contract?

Mr. HORNER. I would like to provide that information, if I may.

Mr. ANDREWS. Do you think they operate it cheaper than the Air Force could operate it?

Mr. OSTERTAG. In other words, how do they compare? Is that it?

Mr. ANDREWS. That is what I want.

Mr. HORNER. The contract with Pan American in fiscal year 1959 is for 7,367 man-years, for the negotiated amount of $68 million. Of course, this is eligible for redetermination.

Mr. ANDREWS. But they are getting $68 million a year to operate the facility down there.

Mr. HORNER. That is right. As I mentioned, they are providing operational elements to the range, they are providing management elements to the range, and they are providing services in the form of logistic and technical services.

Mr. ANDREWS. Why do you plan to operate Vandenberg with Air Force personnel rather than by contract?

Mr. HORNER. Vandenberg is primarily a military operational base.

Mr. ANDREWS. What is Canaveral?

Mr. HORNER. Canaveral is a research and development test site and, as such, it has very extensive and very complex range instrumentation requiring a level of technical operation which we did not feel we could provide from an in-house capability in the Air Force in fiscal year 1954.

Mr. ANDREWS. You could develop Air Force people to supervise all that, could you not?

Mr. HORNER. Not all of it, sir.

Mr. ANDREWS. What part did Pan American play in R. & D. in the production of the equipment that they use down there?

Mr. HORNER. Pan American has a subcontract with the RCA Service Corp. which has the responsibility, under general Pan American supervision, for technical down-range services.

Mr. ANDREWS. Is that all part of the $68 million?

Mr. HORNER. Yes, sir.

Mr. ANDREWS. What part of the $68 million does that subcontractor get?

Mr. HORNER. May I provide that for you? I do not have that in my head.

Mr. SHEPPARD. With the gentleman's permission, when you produce the contract——

Mr. HORNER. It will be in the contract.

Mr. SHEPPARD. For the committee's observation, I want you to include that. Also, I would like to have a statement from the Air Force

which I do not think the contract would provide. It may. If it does, you can disregard the request.

By the way, what kind of contract is this? Is it a cost-plus contract or just what kind of contract is it?

Colonel STEWART. Fixed fee.

Mr. HORNER. It is a fixed-fee contract.

Mr. SHEPPARD. It is a fixed-fee contract.

Mr. HORNER. A fixed-price contract subject to renegotiation.

Mr. SHEPPARD. How frequently is it renegotiated?

Mr. HORNER. On the basis of annual work produced.

Mr. SHEPPARD. Annual work. In other words, it is renegotiated once a year.

Mr. HORNER. As far as the Air Force is concerned; yes, sir. Of course, we have no control over the Renegotiation Board.

Mr. SHEPPARD. That is true, you do not have control with respect to the ultimate decision of the Renegotiation Board, but insofar as your knowledge of the procedure is concerned, it is renegotiated on an annual basis. That is the general procedure, is it not?

Mr. HORNER. Yes, sir.

Mr. SIKES. Are you familiar with a suit which has been brought by the workers against Pan American for alleged noncompliance with Bacon-Davis requirements?

Mr. HORNER. I cannot say that I am familiar with it, Mr. Sikes; no, sir. I am aware of it.

Mr. SIKES. Do you know whether the Air Force is a party to the suit, whether they are charged as defendants?

Mr. HORNER. To my knowledge, the Air Force is not a party to the suit.

Mr. SIKES. Can you tell me, if the suit is decided against the defendant, will the bill for the additional wages be chargeable to the Air Force or be chargeable only to Pan Am?

Mr. HORNER. No, sir; I cannot. That is subject to negotiation.

(Off the record.)

Mr. SIKES. I have been advised that this is a Pan Am responsibility and, if the courts find that Pan Am is not paying enough money, that Pan Am will have to pay the money. However, if this is a cost-plus-fixed-fee contract it is probable the Air Force would be liable for additional costs. The committee should have more information about this and we should have someone before us who can discuss this matter in detail. It may cost a lot of money and make the contract considerably more costly than it had appeared it would be, if the Air Force has to pick up the bill. It may even show the inadvisability of continuing the contract. Can we have more information made available to the committee on this matter.

Mr. HORNER. Yes, sir; we will provide you all the information available to the Air Force.

Mr. SIKES. I would suggest, Mr. Chairman, that we arrange at some appropriate time to have a witness appear who can discuss this matter with us. This is something which could run into several million dollars.

Mr. SHEPPARD. The staff member says a man will be here in the morning.

(Off the record.)

Mr. SHEPPARD. Normal procedure under the contract would be that the legal department would pass upon the issuance of the original contract, and it is within the cognizance of the legal department to see that our basic requirements under existing law are incorporated in the contract, such as the Bacon Act. If it is not a part of the contract, that presents a different legal situation than it would if it were there, insofar as liability of the Air Force is concerned. That is a matter for the legal division to respond to, and I think perhaps you gentlemen would not be justified in discussing that.

Mr. HORNER. May I comment off the record, Mr. Chairman?

Mr. SHEPPARD. Surely.

(Discussion off the record.)

Mr. SHEPPARD. Proceed with your statement.

General WILSON. The supplies and equipment item includes local purchase, reimbursement to the Air Force stock fund for such expendables as fuels and lubricants, and procurement of nonstandard equipment and instrumentation for laboratories and test facilities. For example, the procurement of instrumentation for the Atlantic Missile Range is funded, for the most part, from this area.

The other two items cover a wide variety of miscellaneous expenditures. Examples are travel costs, freight, rentals, utilities, contractual maintenance of equipment, and contract technical representatives.

The cost of operating the R. & D. complex has increased each year, principally due to the growth of such installations as the Atlantic Missile Test Range and the Arnold Engineering Development Center. Every effort has been and is being made to keep the total cost down. We feel that some measure of success is being achieved. The centers are operating efficiently on a minimal basis consistent with the workload they are carrying.

FUTURE CONCEPTS AND EXECUTIVE AGENT EFFORTS

The program that I have discussed is that for which we are asking funds in fiscal year 1960. Next, for a few moments, I would like to acquaint the committee with some of the plans that we have for future weapon systems. These would be candidates for development when studies and technical capability indicate that funds should be committed. Also, I would like to mention some of the projects for which the Air Force is the executive agency.

The success exhibited by the Russians in putting large bodies in orbit indicates a growing Soviet potential to wage war from an environment in space—possibly from satellite vehicles circling the earth at various altitudes, from space stations on the so-called stationary orbits, or perhaps eventually from a military lunar base. To give the United States the capability to retaliate, studies are being made on weapon systems which have the ability to strike targets anywhere on earth or in space. For maximum effectiveness, a space weapon must have the capability of changing orbit and of maneuvering in space after launch. Considerable emphasis is being placed on this aspect of the problem.

Investigations also are underway to determine the most effective means of target destruction in space.

For operations within the atmosphere, requirements have been established to develop a continuously airborne missile launcher and low level weapon system. The use of nuclear fuels for propulsion should

provide virtually unlimited range independent of aerial refueling or staging bases. The combination of an air-launched ballistic missile and a nuclear-powered aircraft would make it possible to attack targets far from the defensive forces of a potential enemy. Advanced weapon system studies along these lines are being conducted simultaneously with the development of the nuclear engine.

In addition, the Air Force is participating, as agent for the Advanced Research Projects Agency, in the development of space systems.

These few examples are indicative of the nature of Air Force thinking for the future and the efforts continually being made to improve the weapon systems already under development.

SUMMARY

To summarize briefly, we have made considerable progress during the past year, both in the development of new weapon systems for the near future, and in the acquisition of fundamental knowledge that will lessen the development problems and costs of more advanced future weapons.

The fiscal year 1960 Research, Development, Test, and Evaluation budget estimate that I have discussed today will permit con inued progress at a reasonable rate. It provides minimum essential funds for the operation and maintenance of research and development activities. It emphasizes the sciences and technologies most closely associated with military research and development. Lastly, it affords priority consideration for the development of new weapon systems which will enable better performance of the Air Force missions.

That concludes my prepared statement.

With the committee's permission, we would like to run about a 20-minute movie.

Mr. SHEPPARD. You may proceed with your motion picture.

(A motion picture was presented to the committee.)

Mr. SHEPPARD. Thank you, gentlemen.

We will stand adjourned until 10 o'clock tomorrow morning.

THURSDAY, APRIL 16, 1959.

NEW LANGUAGE

Mr. MAHON. General Friedman, will you explain the necessity for the new language in the research and development appropriation?

General FRIEDMAN. Yes, sir. Generally the research and development appropriation, consistent with the changes made in the procurement accounts, has been expanded to include development, test, and evaluation covering items for which a decision had not been made for introduction into the operational inventory at the time the budget was put together.

There is also one other minor change, Mr. Chairman, and that is a transfer of service test fuel from the O. & M. appropriation over to the research and development appropriation. I believe the amount included in the fiscal year 1960 budget is $20.2 million.

These are the significant changes in the language. The basic purpose, of course, is to provide consistency between the R.D.T & E.

appropriation and the procurement appropriations as currently established or recommended in the President's budget for this year.

AIR DEFENSE SYSTEMS

Mr. MAHON. Will you give us more information on what research you are doing on air defense systems? What systems are you working on and what are their capabilities? Do you think so much effort on air defense is necessary since our opponents are obviously concentrating on their missile offensive capability?

Mr. HORNER. In the context of your question, Mr. Chairman, I think the research and development work which is being done in the Air Force on air defense weapons can be divided into two categories.

Mr. FLOOD. When you talk about air defense in this case, distinguish between aircraft and missiles, will you, because we are all intensely interested in air defense, but I think the chairman's question deals with that phase of it which is air defense against enemy aircraft.

Mr. HORNER. Yes, sir. That is exactly the point I was going to make, Mr. Flood.

The work we are doing can be divided into two general categories, that of completing the development and deployment of systems which we have been working on in past years, and that work which has been initiated in the past year and is to a great extent related to the ballistic missile and space age, if I may use that term.

We are completing work on the long-range interceptor missile, refining it to get a better weapon, the BOMARC.

We are completing integration of the SAGE system as it goes into operational deployment. We are refining the A.C. & W. radars and preparing for deployment of a better acquisition system. We are continuing the development of a long-range manned interceptor.

This work is all being done substantively to counter the airborne threat, the manned bomber threat, which the Russian has.

Of course, we must consider in the context of our overall program——

Mr. FLOOD. You are not suggesting all of this is Air Force. You are not suggesting that all of these tremendous things are being done by Air Force with Air Force money.

Mr. HORNER. All of the items I have mentioned are being done by the Air Force, because I was discussing this from the point of view of the Air Force research and development program.

Mr. FLOOD. Partly or exclusively?

Mr. HORNER. All the things I have mentioned are exclusively Air Force. There are also other air defense weapons being developed by the other departments in similar categories.

Of course we have had to ask ourselves the question, the relative importance of providing a capability of countering the Russian airborne threat vis-a-vis the missile threat. We feel that it is necessary to finish up the system of air defense to counter the airborne threat which we had designed and initiated development on in the early part of this decade.

Mr. FLOOD. With reference to what, aircraft or missiles?

Mr. HORNER. This is aircraft. This is the Russian airborne threat.

Unfortunately, at this stage of development, deployment, operation, and procurement, this has been a very expensive process. To a considerable extent we have backed away from the original objective. We have reduced the proposed development and deployment of the frequency diversity radar, for example. We have limited, and hoped by virtue of our current development in long-range interceptors to further limit, the number of types of interceptors which we will have deployed. These, indeed, are all steps with the objective of economizing our air defense structure which is posed to counter the Russian manned aircraft.

BALLISTIC MISSILE EARLY WARNING SYSTEM

On the other side, in the other era, we are doing very considerable work to counter the Russian ICBM. We are very deeply involved at the moment in developing and concurrently deploying a ballistic missile early warning system. This is the system which postulates large radar installations in Thule, Alaska, and the northern United Kingdom. This we hope will provide us a capability of detecting Russian ballistic missiles shortly after launch and give us between 10 and 20 minutes warning of a ballistic missile attack.

Mr. FLOOD. Wait a minute. You are talking about a satellite operation now, are you not?

Mr. HORNER. No, sir. This is ground-based, large radar installations.

Mr. ANDREWS. Is that one which will pick up the signal 2,000 miles away? This is above BMEWS?

Mr. MAHON. No. He is talking about BMEWS.

Mr. FLOOD. BMEWS is going to pick up at the launching site?

Mr. HORNER. It will detect the ballistic missiles shortly after they are launched.

Mr. FLOOD. I don't think that is quite what you said, but that I understand.

Mr. HORNER. I am sorry if I misspoke.

INTERCEPTION OF BALLISTIC MISSILES

In addition to that, we have active studies under the aegis of the Advanced Research Projects Agency toward solving the active defense problem. In our working relationships with ARPA, we have an agreement to conduct——

Mr. FLOOD. What is "active defense problem"?

Mr. HORNER. The interception of incoming ballistic missiles with a countermissile purposed to destroy the incoming missile.

Mr. FLOOD. Does "active defense" mean actively shooting at the missile? Is that it?

Mr. HORNER. That is correct, yes, sir.

We have many studies with this objective of active defense. We cannot say that, at this time we have found a solution of such promise that it warrants a systems development program. It is an extremely difficult problem. I think I would describe the core of the difficulty as one related to the economics of active defense.

Mr. FLOOD. Are you in the area of ARGUS now, too?

Mr. HORNER. That is one small element of consideration. It is certainly true that a technical solution can be found for the inter-

ception of what I would call a simple ballistic missile and its destruction. The problem is that every solution comes out to be far more expensive to shoot down a ballistic missile than to launch it. In this kind of game it does not appear very profitable to proceed with the development of this kind of system, because you could counter this simply from the other side by launching more ballistic missiles much more cheaply than you could shoot them down from this side.

Mr. FLOOD. What system? What do you mean by "system"?

Mr. HORNER. As I explained, Mr. Flood, we have not found a system of such promise that we feel warrants system development. I am not speaking of any specific system.

Mr. FLOOD. You mean there is no system?

Mr. HORNER. The Air Force has no active ballistic missile defense system under development. We have many studies.

APPRAISAL OF NIKE-ZEUS PROGRAM

Mr. MAHON. What is your appraisal of NIKE-ZEUS?

Mr. HORNER. Appraising the NIKE-ZEUS is not one of the assigned functions of the Air Force.

Mr. MAHON. But you are a man in the scientific field who gives a great deal of attention to all these related problems, and I would like to know what your general views are with regard to it.

Mr. HORNER. Mr. Chairman, as I understand the NIKE-ZEUS, it is not a system under development for procurement at this time. It is under development, and I am sure there is a great deal of very worthwhile work, development of radar techniques, data handling techniques, missiles, very worthwhile work going on under the NIKE-ZEUS development.

Mr. ANDREWS. Mr. Chairman, that is an example——

Mr. MAHON. I would like his comment on this. I do not think that is adequate comment.

Mr. HORNER. To the extent of my studies and looking at it, the comment I made about the economic trade-off applies to NIKE-ZEUS. We have looked very diligently at this kind of solution for the ballistic missile defense. We perhaps have looked at it from a little different point of view because we are also very deeply involved in the offensive ICBM role. Here again, as I say, my comments as regards the economic trade-off applies to this solution as it does to every other solution we have looked at. It appears to be much cheaper to launch an ICBM than it is to shoot one down.

Mr. MAHON. As I understand it, you are saying that the NIKE-ZEUS and other suggested ways of shooting down ballistic missiles would be so expensive that probably the better answer to the threat is the production of more ICBM's by the United States as an additional threat and deterrent against the opponent. Is that correct?

Mr. HORNER. Yes, sir, that is correct. I think that is only part of the answer, however, because you have to give the Russians capability for being able to do the same thing.

Mr. MAHON. To do what same thing?

Mr. HORNER. Of deploying more ICBM's if they felt that we had an active defensive system that was capable of shooting down some of their ballistic missiles. This is a part of the war game that goes on continuously, of course. If the Russian warmaking machine gave

the United States credit for being able to shoot down with some degree of success, some percentage of success, a part of their incoming ballistic missiles, their obvious response would be to deploy more ballistic missiles.

Mr. MAHON. But that cannot be done in the twinkling of an eye. That is one of the things we seek to achieve, is it not?

Mr. HORNER. No, sir, you cannot deploy an active defense system in the twinkling of an eye, either, and along with the expense of deploying an active defense system is the expense in time and manpower as well as the expense in money.

Mr. MAHON. Then what do you propose, theoretically?

Mr. HORNER. We are still looking for a better solution, and we have some studies out that show some promise. Certainly one of the most difficult aspects of ballistic missile defense is a capability to counter a more sophisticated offensive ballistic missile, one which might provide some decoys. If you are going to use a radar as the sole method of identification of an incoming ballistic missile warhead, then you are immediately faced with the problem of discriminating between the possible warhead and all of the other space objects which the enemy might provide for you to look at with a radar. This is an extremely difficult problem.

We are looking, for example, at the possibility of using infrared detection. Infrared is extremely difficult to decoy during the launch phase of a ballistic missile because it is the product of the tremendous energy output of the rocket engine.

Perhaps there is a solution which can be brought together by using a combination of the radar and the infrared. We have not had enough study yet to see a way to a solution which we feel is promising enough to warrant system development.

Mr. MAHON. How long do you think it probably may take us to get a reasonably adequate active defense against an ICBM?

Mr. FORD. Regardless of cost.

Mr. HORNER. I do not see one in the immediate future.

Mr. MAHON. You do not feel, then, apparently, that the NIKE-ZEUS is the answer. Of course, there are people in the Army who deeply feel that the NIKE-ZEUS is the answer. That is the impression conveyed at least to me, and I believe to the committee. They want to go into the hardware stage of it, as you know.

My inclination is to agree with you, but I do not want to. I would like to feel that within the next few years we could get a reasonably effective anti-ICBM weapon.

Mr. HORNER. Mr. Chairman, I am not a very good authority on the NIKE-ZEUS, and I really do not consider that it is appropriate for me to comment on the NIKE-ZEUS as a system. I am aware of the fact that there have been several very careful studies made of the system by what I consider to be highly qualified technical people, and it was from the results of their studies, as I understand it, that the decision was made not to go into procurement and deployment at this time.

Mr. MAHON. Is it your view that pending a more adequate resolution of the problem of the anti-ICBM, the best thing to do is to expend any dollars which may be available in the production of additional ICBM's by the United States? Is that what you mean to say?

OFFENSIVE CAPABILITY VS. DEFENSE

Mr. HORNER. I am equally not an expert in military deployment. However, in doing the war gaming, the operations analysis which is necessary in the formulation of every research and development program, one at this time cannot help but come to the conclusion that the technical breakthroughs which have been provided to the offense have crea'ed a situation where the offensive capability is easier and cheaper to provide than the defensive capability and, therefore, you immediately go to the conclusion that it is better in this circumstance to emphasize the offense rather than the defense.

Mr. MAHON. The American people might say, "Give us an anti-ICBM. Our lives are at stake. If it costs four times as much to produce one anti-ICBM weapon as it does to produce an ICBM, we still want the anti-ICBM." What is your reaction to that?

COMPLETE SUCCESS OF ANTI-ICBM NOT PROBABLE

Mr. HORNER. My reaction to that is that the defense has never been 100 percent successful. With this tremendous advantage that the offense now has with the advent of thermonuclear weapons and ballistic missiles, it certainly becomes even more difficult to postulate 100 percent success in defense and interception.

So if the American people say they want an anti-ICBM regardless of cost, I think you have to impose on that condition the additional circumstance that in the all-out war they are going to be severely damaged anyway, regardless of buying an anti-ICBM.

Mr. MAHON. For years my view has been that inasmuch as we have never been able to work out a system which would probably knock down all attacking bombers, maybe not more than half of them, it seems most unrealistic, if not idiotic, to expect that in anything like the next few years we could devise a system which would strike down the majority of attacking ICBM's. That is based not upon scientific thought but upon just general knowledge of the facts of life as I understand them. Confronted with this situation we should not despair but work with the greatest speed to try to perfect the anti-ICBM, regardless of the difficulties. My point is we should not deceive ourselves and the American people.

Mr. HORNER. From all our scientific studies by the very best people we have been able to bring together, we certainly could not disagree with that.

(Off the record.)

AIR FORCE ANTI-ICBM CONCEPTS

Mr. ANDREWS. I do not think there is any question that the chairman stated correctly that there is a great need for an anti-missile-missile system. You say the Air Force has none.

Mr. HORNER. That is correct.

Mr. ANDREWS. And the Army does have one, ZEUS.

Mr. HORNER. It is my understanding that the Army is working on the development of one.

Mr. ANDREWS. Some of their scientists think that the research and development of the ZEUS system has gone far enough to justify ap-

propriation of money for production of the system. It occurs to me that since you have no program of any kind, you ought to put some of your best brains with the Army and go forward with the system they have. I would like to hear from the general on this.

General WILSON. I am sure, first of all, that Mr. Horner did not mean to imply that since the odds are so heavy against the defense, we should not try to put up some defense. We must. It is not quite fair to say that the Air Force does not have this matter under consideration. We do.

Mr. ANDREWS. I am sure you do, but I understood him to say that you have no system in mind, that you have not even reached the blueprint stage of a system.

General WILSON. We have some concepts which look promising. We have not yet dignified them by calling them a system. I will tell you some of our concerns.

Mr. FORD. May I ask, what was all this talk about the WIZARD system? Was that not an anti-missile-missile system, or do I have the wrong impression?

Mr. HORNER. You have the right impression, Mr. Ford. The WIZARD system was the product of the studies that I had mentioned. A very careful analysis of the WIZARD system led us to the conclusion that it was more costly than it was worthwhile; that although it would produce a capability to intercept the simplest incoming ballistic missiles, it would be extremely costly in deployment and it could not offer anything like the probability, the percentage, of interception which would justify this tremendous expense.

It was on the basis of this kind of review by the Air Force and by the Office of the Secretary of Defense that the WIZARD system, as a system development, was not carried out.

General WILSON. I would like to continue off the record, if I may, sir.

Mr. ANDREWS. I would like you to, General.

(Discussion held off the record.)

INFRARED DETECTION SYSTEM

General WILSON. The most promising detection device at the moment appears to be infrared. It shows considerable promise, but it needs a lot of study.

This means detection early in the flight of the missile. There is a possibility, also, that this infrared could be used for tracking purposes.

Mr. ANDREWS. Do those infrared rays come from a satellite in orbit?

General WILSON. No, sir. They come from the flame of the booster lifting the missile aloft. We are very much interested in this area because it has some byproducts. If we can use it, it means we will be forced actually to go after the enemy's missile far from our shores.

Mr. FLOOD. Is infrared all-weather?

General WILSON. Infrared has certain limitations. This is one of the areas we have to examine.

Mr. FLOOD. Cloud cover?

General WILSON. If the cloud cover is dense enough, it might affect the missile close to the ground, but if it happens to be burning still as it reaches altitude, we could see it.

We think that this is so promising that we would like to spend more time studying ways to exploit it. It might turn out that we can use satellites. It might turn out that in the interim we can use aircraft. We have had considerable success watching the missiles at Cape Canaveral.

Mr. FORD. By this method?

General WILSON. By this method, yes, sir. We like it. It gives us some hope of striking the missile over the enemy's territory, at least far away from our own territory.

Mr. ANDREWS. With what?

General WILSON. With an antimissile.

In looking at this, we feel that the missile itself, the antimissile missile, is probably the least part of the problem, and we can afford to wait on the determination of the missile until we have solved these other problems. If they do indeed show promise, we can pick up the missile and modify it.

STATUS OF NIKE-ZEUS DEVELOPMENT

Mr. ANDREWS. General, are you familiar with the NIKE-ZEUS program of the Army?

General WILSON. Only in general terms, sir. I am not an expert on NIKE-ZEUS.

Mr. ANDREWS. Some of those men say it will work, and if they had the money they are ready to produce it.

General WILSON. I am quite sure they are sincere in this.

Mr. ANDREWS. I would like to see your people get with the Army people and try to develop that system. They do have a system which is in research and development stage, and I hope you are not prejudiced against the NIKE system just because it originated with the Army.

General WILSON. No, sir, I am not prejudiced against it, I can assure you, but I do think there is one thing which perhaps Mr. Horner should have stated, and that is that if R. & D. develops in the normal pattern as it has in the past few years, it will indeed take a while to come up with something which we feel is satisfactory, but we are trembling always on the edge of a breakthrough. We never know when this will happen. As an optimist, I am hopeful that it will not take too long.

Mr. ANDREWS. The Army people told us they were so near production that they went to the Secretary of Defense, as I recall, with their request for production money in this budget, and that it was there at that top level that they were denied the ZEUS.

JURISDICTION OVER ANTI-ICBM PROGRAM

Mr. SHEPPARD. While you are on that point, may I ask this: Just what is the jurisdictional situation here? It seems to me that is very definitely involved, from the questions which are being propounded. Am I right in assuming that you have in the Office of the Secretary of Defense the determination of what particular missile will be in research or development? Is that right or wrong?

General WILSON. I would say that is correct, sir.

Mr. SHEPPARD. If that is correct, irrespective of what you in the Air Force may be thinking, the very best you can do is to take your thoughts up to that place for determination.

General WILSON. Yes, sir.

Mr. SHEPPARD. You have no arbitrary position here, as I interpret the procedure as evidenced in the testimony of Dr. York and Mr. Quarles yesterday.

General WILSON. That is correct.

Mr. FLOOD. I did not hear that.

Mr. SHEPPARD. I said in so far as their jurisdiction pertains, the only thing they can do with any ambitions they may have is to present them to that authority for their acceptance or rejection. That was clearly indicated by Dr. York and Mr. Quarles in their statement, and I assume that is your interpretation of it.

General WILSON. Yes, sir. Perhaps I had better clarify this a little from my standpoint. The antiballistic missile defense project is a responsibility of ARPA. ARPA has assigned to the Air Force the problem of the ground environment, not the active defense but the ground environment. However, ARPA has not denied us the right to make studies. So in the active defense area we have been limited to the study field, but this does not mean if we can come up with a good concept we cannot take it back to ARPA and have it really considered.

AIR FORCE KNOWLEDGE OF NIKE-ZEUS

Mr. FLOOD. Mr. Secretary, what is your title? You are Assistant Secretary of the Air Force for what?

Mr. HORNER. Research and Development.

Mr. FLOOD. Assistant Secretary of the Air Force for Research and Development. That includes the area of interrogation which the chairman has raised this morning, does it not, anti-missile-missiles, which we have been talking about since we started?

Mr. HORNER. Yes, sir.

Mr. FLOOD. What is your title, General?

General WILSON. I am the Deputy Chief of Staff for Research and Development.

Mr. FLOOD. The Deputy Chief of Staff of the Air Force for Research and Development.

General WILSON. That is correct, sir.

Mr. FLOOD. And that includes the area of the examination thus far this morning, among other things.

General WILSON. Yes, sir.

Mr. FLOOD. Mr. Andrews, here we have the Assistant Secretary of the Air Force for Research and Development, and we have the Deputy Chief of Staff of the Air Force for Research and Development, who admittedly see nothing within reason on the horizon with reference to an anti-missile-missile system, and both of them say not only are they not developing any part of this anti-missile-missile system, but they do not consider themselves sufficiently informed on a system developed by the Army people, their very opposite numbers, the Assistant Secretary of the Army for Research and Development, and the Deputy Chief of Staff of the Army for Research and Development,

General Gavin, who by the way resigned because of this very part. That was the straw that broke the camel's back.

Yet these Air Force people this morning can tell us nothing about this proposed system under this unified command.

Mr. FORD. Will the gentleman yield?

Mr. FLOOD. Yes.

Mr. FORD. In all sincerity, I do not think that is a legitimate criticism, because they have plenty of problems aside from getting into the details of a program that has been arbitrarily assigned by the Secretary of Defense or his underlings to another service.

Mr. FLOOD. Mr. Ford, whether it is a justifiable criticism or not, I have no intention at this point of making a criticism. I was asking a rhetorical question. But now that you challenge its quality as a criticism, now I indict them expressly. It may be for the reasons you stated, but that is no reason. I just cannot conceive, under what we laughingly call unification, that these men at their level of the Air Force would hide behind their duties and blind themselves to what another branch of the service says is a practical system to the point where that other service, the Army, has asked the Secretary of Defense for money in this budget for hardware. The Army has gone so far as to ask the Secretary of Defense for hardware for a system. Yet the two top Air Force people plead nolo contendere or non vult, I guess.

Mr. SHEPPARD. Just a minute. Let me say this to my friend from Pennsylvania.

Mr. FLOOD. What do you want to say it to me for? Say it to them.

Mr. SHEPPARD. I want to say it to you because you have expressed your views, which is your privilege. I am not quarreling with your privilege. It seems to me, after the authority vested in the Secretary by the Congress has become effective, these people are subject to the instructions emanating from that source of authority.

Mr. FLOOD. What source of authority?

Mr. SHEPPARD. The source of authority vested in the Secretary of Defense to determine what should be done by coordinating the programs.

Mr. FLOOD. That is no reason for pretending that the baby does not exist.

Ignorante leges non excusat.

This is my morning for those phrases.

Mr. SHEPPARD. Yes, it is.

Are you in a position under the authority vested in the Air Force to evaluate the missiles from other departments, that is, the Navy, the Army, and the Marine Corps? Do you have that jurisdiction and authority?

Mr. HORNER. We do not have it as an authority; no, sir. I have not, to my knowledge, been denied any information that I have requested.

Mr. SHEPPARD. That's not the point. I am not being critical. You either have the authority or take the liberty. Which course do you pursue?

Mr. HORNER. I would like to point out one error in Mr. Flood's indictment, if I may.

Mr. SHEPPARD. Answer my question and then answer his. You either have the authority or you take the liberty. Which course do

you pursue? I am not asking the question idly. I want an answer to it.

Mr. HORNER. I am not sure that I understand the question.

If it is whether or not we have looked into the NIKE-ZEUS program as a part of the Air Force evaluation in detail, this has not happened in the past year. It happened previously.

It was in answer to your question that, I wanted to mention to Mr. Flood I do not think I stated that I did not have sufficient knowledge to respond to the chairman's question. I think that I stated I did not feel it was appropriate for me, as Assistant Secretary of the Air Force for Research and Development.

Mr. FLOOD. We think otherwise. I think otherwise. I do not care what the chairman thinks. If you are the Assistant Secretary for the Air Force, let us try to break down these barriers. I do not know NIKE-ZEUS from my grandmother's petticoat. And neither does anyone on the committee. The Army comes in here and they sell us a package. They say that this has been going on for years. They say here is a system, so much so is it a system that we have gone to the Secretary of Defense and asked for money for hardware in this budget. For reasons that were his business he saw fit to deny them. That is another problem. Now you come in here and you say that the Air Force has no system at this time; that you are working on it. You are doing the best you can. We do not have one.

We say to you, all right; there is nothing the matter with that, but the Army says that they have one. Why do you not drop what you are doing? Why do you not abandon your operation, join hands with the Army and either show the Army that they are out of their minds, or that maybe they have something, and all of you get together and try to give us what we think the American people want. Why do you not do that? Maybe the Army is wrong. I do not know. I think that you ought to know.

What you think about what we should do leaves me cold. Do not hide behind lateral fear. That does not interest me.

What about this crowd? Do they have anything or do they not?

Mr. HORNER. Both the Army and the Air Force research and development programs are under the management and supervision of the office of Dr. York.

Mr. FLOOD. I know all about that.

Mr. HORNER. The NIKE-ZEUS program was carefully looked at by a technical committee on which Dr. York served. I have the greatest confidence in the scientific competence of that group. They came to a conclusion with reference to the NIKE-ZEUS program. I personally had such confidence in the conclusion they came to that I did not feel it was necessary for the Air Force to make a detailed review of the NIKE-ZEUS program at this time.

AIR FORCE STUDIES OF NIKE-ZEUS

Mr. FLOOD. Did the Air Force ever make any detailed examination separate and distinct from the Army of the Army program? Did you, as Assistant Secretary of the Air Force, ever call up General Zilch and say, "General, I wish that you would take a look at what the Army has been doing in this. Take a half a dozen fellows and go

down to the proper room and stay there until you examine this NIKE-ZEUS operation and let me know what you think."

Did you ever do that?

Mr. HORNER. Yes.

Mr. FLOOD. What happened?

Mr. HORNER. We came to the conclusion this approach to the NIKE-ZEUS missile did not warrant Air Force support.

Mr. FLOOD. Well, that is the end of it. Why did you not tell me that a half hour ago? That is that. No matter what the Army said, no matter how enthusiastic they are, no matter how good they are, you have had the NIKE-ZEUS program examined by your own experts and they have reported to you and as far as you are concerned you have decided in the Air Force that it is not worth the effort; is that right?

Mr. HORNER. We decided——

Mr. FLOOD. Is that or is that not it?

Mr. HORNER. I am sorry but that question cannot be answered categorically.

Mr. FLOOD. Well, you answer it.

Mr. HORNER. In the presence of an already virile, large Army program, we do not feel that that solution to the ballistic missile defense problem warrants any additional Air Force support.

Mr. FLOOD. I consider that evasive. I do not think it is responsive. You, in replying to a question of mine a minute or two ago, said on your own initiative, and quite properly so—although you did not volunteer the information, I had to drag it out of you—that you ordered and delegated some of your technical personnel to examine the Army NIKE-ZEUS program to see what value it had. Your men did that.

Mr. HORNER. I should have said, or I thought I said in answer to your question——

Mr. FLOOD. You said it when I asked the question. There was a very important thing that you did not volunteer. I cannot hate you for that. The fact remains you did not. As a result of a report made to you by your experts in whom you had complete confidence, the Air Force, as a matter of policy, decided that the Army's NIKE-ZEUS program, as far as the Air Force was concerned, was not of sufficient value in its system to warrant any further Air Force support. Is that it?

Mr. HORNER. In the presence of an already operating Army program and in our present management structure, that is it.

Mr. FLOOD. What do you mean by that?

Mr. HORNER. The very fact the Army has already quite an extensive operation in the NIKE-ZEUS program would have some influence on our determination to recommend that the Air Force also participate in the same program.

COOPERATION WITH ARMY

Mr. FLOOD. Let me ask you this: You have told us that you have no system worthy of the name for anti-missile-missiles; yet you also tell me that the Army, to your knowledge, has a substantial program to that end, and yet you, with nothing, refused to lend anything you had to the Army who have gone as far as you admit they have. Why not? Why do you not help them?

Mr. HORNER. I do not agree that we have refused.

Mr. FLOOD. You told me so.

Mr. HORNER. No, sir.

Mr. FLOOD. Do you want an invitation? Do you think that there is some burden or duty upon you to go to the Secretary of Defense through channels, or to this committee? What do you say to me now. I am a member of the Appropriations Committee. I say to you, Mr. Secretary, in view of what you have said yourself, in view of the fact of the Army program for NIKE-ZEUS, in view of the fact that you admittedly made no such program of such a nature, or degree of development, why do you not assure me that you will lend every resource, every dollar, and every brain that you have to executing that program starting now?

Mr. HORNER. Let me set the record straight first. We are cooperating with the Army. We have provided them resources when we have been requested to do so. It is not within our authority to provide resources to the NIKE-ZEUS program without being so directed by the Secretary of Defense.

Mr. FLOOD. Are you going to wait for a direction?

Mr. SHEPPARD. He has to.

Mr. FLOOD. He does not have to do anything of the sort.

I am asking you, do you stand ready and willing——

Mr. HORNER. You interrupted my answer.

Mr. FLOOD. Of course I did. You were not answering.

Mr. HORNER. I was going to say in further answer that, we do not rate the NIKE-ZEUS program of sufficient promise or importance to recommend to the Secretary of Defense, through our own initiative, that the Air Force provide additional unsolicited support.

Mr. FLOOD. That is the Air Force's position vis-a-vis NIKE-ZEUS.

Mr. HORNER. That is correct.

Mr. FLOOD. That took half an hour.

Mr. SHEPPARD. I would like to propound further questions if I may.

Mr. FLOOD. By the way, the NIKE-ZEUS program was killed by a 2 to 1 vote. Do you know that?

Mr. HORNER. Am I familiar with that?

Mr. FLOOD. The answer is yes?

Mr. HORNER. I did not know that it was killed, Mr. Flood.

Mr. FLOOD. The hardware and the procurement. That is what we are talking about. Do you or do you not know that fact—that the Army's request for hardware was killed by a 2 to 1 vote?

Mr. HORNER. No, sir; I cannot say that I do.

INFRARED DETECTION SYSTEM

Mr. SIKES. With regard to the infrared program that General Wilson was discussing a moment ago, it was brought out that although the infrared systems have great promise, nevertheless they can be countered under battlefield conditions by the use of an aluminum oil emulsion, or by the use of aluminum chaff which makes it impossible to obtain an effective or correct image of the enemy weapon.

Do you foresee applications of a similar defensive activity which could be used in the missile program to minimize your ability to detect missiles with an infrared system? You recognize that it could be

done much more simply under battlefield conditions but do you foresee such a possibility?

General WILSON. Well, sir, of all the radiation devices, it appears that the IR is the most difficult to jam. There is no radiation device we know of that cannot be jammed in some manner. But the IR appears to be in a class by itself in this respect, far more difficult than radar, for instance. Does that answer your question?

Mr. SIKES. Well, I take it your answer is while you foresee that such difficulties may arise, you think that they will be of less importance than the difficulties that will arise with other detection systems?

General WILSON. Yes. It is a matter of degree.

DYNASOAR SYSTEM

Mr. SHEPPARD. Your DYNASOAR project is not being developed as a weapon system. Why? Does it not have some military application?

General WILSON. It is really an exploratory effort. It is an exploration into a quite unknown field. Conceivably, someday a weapon system might grow out of this, but we feel the way to make the greatest progress with the least expense at the moment is to develop this as a prototype without attempting to tie it to any further use.

Mr. SHEPPARD. And then let the development determine what future application may be made?

General WILSON. That is our present plan, yes.

Mr. FORD. Can it be expedited? Is it far enough along the way so that it could be expedited?

General WILSON. I am sure that it could be expedited to some degree. Just how much, I am not prepared to say, but I could get an answer for you. I am sure that a little more money would do it.

Mr. FORD. Is it the Air Force's position, all things considered, that it should or should not be?

General WILSON. I believe the feeling at the moment is it is about at the proper level, since it is not aimed at a weapon system yet. It is an experimental thing following logically after the X–15.

Mr. FORD. You are planning to spend how much on it in the fiscal year 1960?

General WILSON. $35 million.

Mr. FORD. If you were to expedite it what would be your general idea as to the extra amount of money that would be involved in the fiscal year 1960?

General WILSON. Well——

Mr. FORD. Give us a general statement and you can supply an accurate statement for the record.

General WILSON. I would say that an additional $10 million as a maximum at this stage of the game.

DEVELOPMENT OF ESTIMATES ON BASIC RESEARCH PROGRAM

Mr. SHEPPARD. Basic research, by definition, is concerned with search for knowledge to be applied to future projects. Now, how do

you estimate your budget requirements for basic research? That is, how can you know that you want $49.5 million in 1960 as compared with $54.6 million in 1959?

General WILSON. We have a most carefully developed process in making this determination, sir. We have a priority system which lists all the activities that we would like to pursue. We associate the basic research and development with the military requirements. We are quite certain of a minimum figure. The maximum figure is as long as there is money available. We are satisfied.

Mr. SHEPPARD. In other words, you are projecting the assumption within the confines of your budget allocation?

General WILSON. That is correct. It is a matter of judgment as to how much can be spent.

BASIC RESEARCH CONTRACTS

Mr. SHEPPARD. With what types of firms or institutions do you enter into basic research contracts? Are they mostly educational institutions?

General WILSON. I would like for General Demler to reply as to that.

General DEMLER. I am Director of Research and Development, Deputy Chief of Staff, Development.

The answer is "Yes," to the educational institutions and universities and nonprofit institutions as distinct from industrial research laboratories.

COORDINATION OF BASIC RESEARCH PROGRAMS

Mr. SHEPPARD. What efforts are made to coordinate Air Force basic research programs with similar programs in Army, Navy, and ARPA? What procedure is set up to exchange information with them?

General DEMLER. The basic research program of the Department of Defense is monitored by the Coordinating Committee on Sciences of the Department. This facilitates the three department basic research groups to exchange their program documents covering each and every research project through a standardized Department of Defense format as well as the periodic meetings of the coordinating group.

NUCLEAR PROPULSION FOR AIRCRAFT

Mr. SHEPPARD. Give us an honest appraisal of some of your major advanced projects.

For example, just how far along are you with the development of a nuclear propulsion system for aircraft?

General WILSON. This is in another category, not so much basic research any more.

Mr. SHEPPARD. I realize that.

General WILSON. It is in the area now of demonstrating feasibility of propulsion systems primarily. As you know, this project urgently needs propulsion equipment to get into the air to gain experience with the machine in its natural environment.

We are, at this point, studying the best way to get the nuclear propulsion machinery which is under development into an aircraft.

Mr. SHEPPARD. But as of the moment you are not in the development status?

General WILSON. We do not have an airplane in the program at this time; no, sir.

Mr. ANDREWS. May I ask a question? Do you think that you will ever get a nuclear-propelled airplane in the air? If so, when? I have been on this committee about 8 years and I have been hearing about it and very little progress has been reported.

General WILSON. Sir, we believe now that the reactor development and engine development have reached the point where we should lay down an airplane.

Mr. ANDREWS. I have been hearing that now for 3 or 4 years.

General WILSON. I am giving you now my honest and considered opinion on this. By the time this airplane is developed we believe that the reactor and engine will be ready to go into it.

Mr. ANDREWS. So my question had two points. Do you believe that we will ever get one into the air with a nuclear powerplant, and your answer to that is "Yes"?

General WILSON. Yes.

Mr. ANDREWS. And the second point is, when?

General WILSON. That is a tough question for me to answer. We could do it if we had the money to do it in, say, 5 years. When it comes to money——

Mr. ANDREWS. Five years from now if you had the money?

General WILSON. Yes.

The problem now is once more a judgment as to how we should best spend our money. With a fixed budget we find things that we cannot afford to do and we find things that we must do.

Mr. FLOOD. A fixed budget?

General WILSON. A fixed budget—a fixed amount of money. If we had unlimited means we could do many things.

Mr. FLOOD. What do you mean by a fixed budget?

General WILSON. A limited amount of money to do the many things that we must do.

Mr. ANDREWS. I have been under the impression this committee has given you plenty of money for this particular project; namely, the production of a nuclear-powered airplane. Has money been any problem with you in connection with the nuclear-powered airplane?

General WILSON. An airframe, yes. The committee has given us enough money to carry on the development of the plant, the powerplant.

Mr. ANDREWS. That is what I thought.

General WILSON. And we have been restricted to that so far.

Mr. WEAVER. How much money has been involved in this so far?

General WILSON. I am guessing. I would like to give you a corrected answer later, but on the order of $987 million.

Colonel STEWART. Air Force money, $465 million through the fiscal year 1959.

Mr. FORD. Could we have for the record the annual increments that have been made available for this program to the Air Force in chart

form, showing the fiscal year and the dollars involved, and if you can get it—and I am sure you can—funds for the same program from other sources.

Colonel STEWART. The Atomic Energy Commission, for example.

(The requested information follows:)

ANP manned aircraft program by agency (obligations) fiscal year 1946 to fiscal year 1960

[In millions]

Fiscal year	U.S. Air Force		Navy	AEC	
	Operations	Facilities	Operations	Operations	Facilities
1946	$1.3				
1947	2.0				
1948	6.2		[1] $1.0		
1949	6.9		[1] .5		
1950	5.3			$1.4	
1951	2.8			5.5	$0.5
1952	10.0	$6.0	[1] .5	10.7	.2
1953	22.6	6.3	.2	17.8	12.3
1954	6.2	.2	.1	15.2	3.1
1955	22.4	6.4	.5	23.9	.7
1956	46.4	57.4	3.7	46.7	3.0
1957	66.1	35.6	1.5	73.4	9.4
1958	60.5	2.4	2.9	66.6	9.0
Subtotal	258.7	114.3	8.9	261.2	38.2
1959 (estimated)	63.4	5.8	3.5	72.8	[3] 13.4
1960 (estimated)	68.0	7.0	2.0	[3] 73.4	
Total	390.1	127.1	14.4	407.4	51.6

[1] Navy funds transferred to Air Force which are included in the Air Force amounts. These amounts are not included in the Navy total.
[2] Excludes $0.3 of prefinancing.
[3] Based on current program planning, the total amount may not be placed under contract during fiscal year 1959.

Mr. SIKES. As I recall the testimony in previous years, there has not been particular emphasis on this type of aircraft, although this committee has frequently expressed its concern about the fact that the United States has not been pressing more vigorously for a nuclear-powered aircraft. The reaction has been generally, if I recall it, that it was not of sufficient importance to place greater emphasis upon it.

This year, for the first time, there appears to be an entirely new stimulus toward securing such an aircraft and there is a considerable request for money—$75 million. What has brought about the change? Is it altogether the state of the art, or is it the sudden decision that after all this does constitute a valuable weapon in that it can cruise indefinitely and carry missiles which can be launched from a distance to selected targets? Which is it?

General WILSON. Well, I think that the state of the art has advanced considerably. We can now look toward an airplane with a great deal of confidence. This was not true just a short time ago.

Mr. SIKES. The administration has not pursued the development of a nuclear-powered aircraft vigorously heretofore according to the evidence given to this committee and this probably has given the Russians a clear lead on us.

General WILSON. That may have been, sir. It has been a joint effort.

Mr. SIKES. Has there been a new realization of the usefulness of

this aircraft which has now stimulated a request for $75 million, or are there other factors involved?

General WILSON. No, sir. We do foresee a very useful weapon system. However none of the $75 million is for the airframe work.

Mr. SIKES. Why has this emphasis been so long in coming? We have felt on this committee there should have been more emphasis on a nuclear-powered aircraft in previous years. I know that the state of the art has entered into it, but the state of the art enters into all new developments, and as additional emphasis and stress is placed upon them the state of the art can be expedited. Is it a combination of all of these things?

General WILSON. I think it is a combination of those things. In the fullness of time people are given to realize the potential, and at the same time the state of the art is catching up with us.

I would not propose that we immediately develop a weapon system. I would much prefer to see this put in a flying machine which some day could evolve into a weapon system. I think it is too early to visualize this equipment as a full-blown weapon system. It is not too early to start working out the problems of flight.

Mr. SIKES. I fully agree it is important enough for us to be working on it and to justify this expenditure.

You used the term "5 years." That would almost certainly place us in a secondary position to the Russians if the general predictions about their ability to get into the air with such a plane are carried out. Do you feel that this matter is worth the stimulus of further funds in order to get it into the air in less than 5 years, or do you think that the problem is so great that you cannot do it in less than 5 years? What is the situation?

General WILSON. I think that we have a choice here. If we wanted to come up with a stunt, or a special purpose. I am sure that we could reduce the time, but this is a very costly enterprise, as you know.

Mr. SIKES. Yes.

General WILSON. We would like to develop an airplane that has a future capability; a potential for growth. This takes a little longer time.

Now, with this process, when we do have our nuclear airplane flying, it will be a real flying machine, not just a stunt.

Mr. SHEPPARD. In conjunction with what Mr. Ford asked, the Congress, as I recall, has consistently granted the budget requests in this field.

General WILSON. Yes.

Mr. SHEPPARD. When you are supplying the information with respect to the question he asked, will you also supply the total amounts received over a period of time from the Congress in this field and how much of that money was released to you for the purpose justified? Will you add that to his question?

General WILSON. Very well.

PROGRESS IN DEVELOPMENT OF NUCLEAR POWERED AIRCRAFT

Mr. WEAVER. What has been accomplished so far on this if you have spent that kind of money? Where are we now compared to where we were when we started?

General WILSON. I believe that we can claim to have made considerable progress. We do have an engine. We do also have a reactor. Both of these things need refinement. But we have sufficient confidence in the progress made to believe, by the time we can get an airplane developed to put them in, they will be ready to go.

ADEQUACY OF BUDGET FOR NUCLEAR AIRCRAFT

Mr. FORD. General Wilson, do I gather from your testimony that you endorse the program that is included in this budget for the nuclear-powered aircraft?

General WILSON. I personally am disappointed that we do not have the money to produce a prototype nuclear-powered airplane.

Mr. FORD. The fiscal year 1960 budget?

General WILSON. Yes.

Mr. FLOOD. You do not have what?

General WILSON. The money necessary to get along with the nuclear-powered airplane, but I do realize that this is a relative matter and there are so many other things that we must produce that I feel that I have had to accept the carrying of the program as it is. It is a disappointment.

Mr. FORD. How much is involved for this expanded program that you feel might be wise?

General WILSON. It would not cost a great deal in the early stages.

Mr. HORNER. May I add this: We did have a program to do this at one point in the budget formation, and in both budgets—the Atomic Energy Commission and the Air Force budgets—it amounted to about $40 million over the current $150 million.

Mr. FORD. In the fiscal year 1960?

Mr. HORNER. In the fiscal year 1960.

Mr. SIKES. How much time would you gain?

Mr. HORNER. We postulated at that time having a flying article in late ———.

Mr. FLOOD. May I refer you to page 7 of your statement? There is an interesting paragraph there where you mentioned all of this. You say: "$75 million for aircraft nuclear propulsion development represents the Air Force's share——"

General WILSON. Yes.

Mr. FLOOD (continuing). "Of the joint program with the Atomic Energy Commission."

General WILSON. Yes.

Mr. FLOOD. So you are not running this show by yourselves. They are in the act too.

General WILSON. Yes.

Mr. FLOOD. "The X–211 General Electric direct single engine will require most of the aircraft nuclear propulsion money in 1960."

General WILSON. That is correct.

Mr. FLOOD. However, you say, "Funds also cover associated work on engine and reactor compatability, radiation effects, and safety analyses."

General WILSON. That is correct, sir.

Mr. FLOOD. So this is not solely an Air Force responsibility?

General WILSON. Oh, no.

Mr. FLOOD. If you do not have a program it is not just your fault alone?

General WILSON. No; it is not our fault alone. I would not want to throw an onus on the Atomic Energy Commission either.

Mr. FLOOD. Do not worry about them.

General WILSON. This is the development of the engine that we are speaking of here. We would feel that the development of the aircraft is an Air Force responsibility. We would expect to handle that ourselves.

COST OF EXPANDED PROGRAM

Mr. FORD. Could we have a breakdown of the specific figures included in the expanded program, the part that would be for Air Force research and development and the portion that would be for the Atomic Energy Commission's research and development?

General WILSON. Yes.

(The information requested is classified and has been furnished for the committee's use.)

HOUNDDOG MISSILE

Mr. SHEPPARD. How good do you consider the HOUND DOG missile from an accuracy standpoint?

Colonel STEWART. Off the record.

(Discussion off the record.)

Mr. SIKES. Some HOUND DOGS have a much better nose for a trail than others. Is that true of these?

General WILSON. Yes. We are talking about the CEP.

AIRBORNE BALLISTIC MISSILE

Mr. SHEPPARD. How good do you expect the airborne ballistic missile to be from an accuracy standpoint?

General WILSON. We would hope that eventually it would have the same sort of accuracy as the HOUND DOG.

Mr. SHEPPARD. How will your antiradiation missile work and how good do you think it will be?

Mr. FLOOD. On the airborne ballistic missile, will you ask the Colonel to tell us a little bit more about that operation? I know practically nothing about airborne ballistic missile operation—what kind of aircraft and what kind of missile? What is this all about?

Mr. SHEPPARD. When you reply to my question you may reply to the question asked by Mr. Flood.

General WILSON. I will try to answer both of them intelligently.

The air-launched ballistic missile is fairly new. We have been carrying on studies for an air-launched missile. We were not quite certain in our minds whether this would be a gliding missile or a ballistic missile. Recently, the ballistic missile has shown the greatest promise.

Mr. FLOOD. By "gliding" do you mean "guided"?

General WILSON. It would have a programed sort of guidance system.

Now this missile would be designed for our strategic bombers. The purpose of it would be to stand off from enemy defenses and to lob these missiles into the target from a distance.

Mr. ANDREWS. Is this the missile that you are talking about on page 2 of your statement? Is it where you say:

Recently, an air-to-surface missile with a ballistic trajectory was fired experimentally from a B–58 HUSTLER in supersonic flight. The potential value of this new strategic weapon is tremendous.

General WILSON. That is the one.

Mr. ANDREWS. Will you tell us about that?

Mr. FLOOD. What about that show?

Colonel STEWART. We started first on feasibility work, and you saw two things in the movie yesterday. Here we were proving the feasibility of the programed guidance, the separation from the aircraft.

(Discussion off the record.)

Colonel STEWART. I have to get back to my word of the feasibility of doing it. From there we have gone and are going to a design competition. We will go into a more definitized weapon system. We were proving the feasibility of it rather than having either one of them being a prototype weapon.

Mr. FLOOD. A ballistic missile?

Colonel STEWART. Yes. Both of those that you saw in the movie yesterday were ballistic missiles. They both programed upward on a ballistic trajectory.

Mr. FLOOD. What is your target? How good is this bird? What are you going to do with it? You say it is going to be hot. Why? Other than this standoff feature, what about this pigeon?

General WILSON. A weapon of this sort can be used against mobile targets. It can be used against forces in the field. It can be used also against the normal fixed targets that you fire a ballistic missile toward

Mr. FLOOD. Is this a HOUND DOG with lace curtains, or what?

General WILSON. This is a very much advanced weapon of the HOUND DOG variety. Now the HOUND DOG, you realize, is an air-breathing missile.

Mr. FORD. What is the longest range that you are talking about?

General WILSON. We are thinking in terms of medium ranges which does not mean that it could not be used for shorter ranges also.

Mr. FLOOD. What was that last sentence?

General WILSON. We do not mean that it could not be used for shorter ranges.

Mr. FORD. I am intrigued with this objective of hitting a moving target with a ballistic missile. That is the first time that I have heard that discussed in any survey.

General WILSON. I was not accurate in my statement; that is, targets that moved. There are such things as the moving of ballistic missile launching sites in railroad cars from point A to point B.

Mr. FORD. You do not mean a target in the process of moving?

General WILSON. That is right.

Mr. SHEPPARD. A fixed target with a mobile base?

General WILSON. It is moved.

Mr. FLOOD. For the purpose of the committee, and as far as security will permit, will you have one of these fellows give us a little more on the record about this bird?

General WILSON. Very well.

(The requested information follows:)

Four of the contractors who participated in the early 1957 competition for the GAM–77 HOUND DOG, our B–52 turbojet air-to-surface missile, recommended a ballistic air-to-surface missile. Development of the ballistic type was deferred due to the urgent need for a strategic ASM, the near "off-the-shelf" nature of the air-breathing turbojet missile and the risks then inherent in the ballistic approach. However, at no cost to the Government, contractor studies of ballistic types were initiated under an ARDC study requirement. Fourteen major contractors participated. Their analyses concluded that a long-range rocket powered ASM was feasible. Although the formal study period ended officially in February 1958, most of the contractors continued their studies for another 6 months.

The results of these studies were used to establish a general operational requirement for an advanced-type ASM. This missile is intended to be a follow-on to the HOUND DOG with sufficient superior performance to be highly invulnerable to enemy defenses through 1970. This missile will be carried initially by the B–52.

A series of operational studies conclude that the ASM is an important and effective complement to other weapon systems. Air-to-surface missiles reduce bomber vulnerability to defenses, increase force firepower to compensate for increasing numbers of targets, and give the force added employment flexibility for a relatively small cost.

These ASM's will be used as an integral part of the bomber weapon system and are weapons on alert whether the aircraft are on ground or airborne alert. Normally, ASM's will be launched prior to penetration of defenses and will be used against precisely located, heavily defended targets. Two will be carried in addition to normal bomb load and can be used in any type of war.

With regard to economic considerations, study results show that equipage of bomber forces with air-to-surface missiles greatly enhances bomber system cost effectiveness.

Early in 1958 a series of technical feasibility flight demonstration programs was initiated. These were designed to provide sufficient factual test information to establish confidence in theoretical data relating to technical feasibility of advanced performance ASM's. These programs were quite inexpensive and used existing off-the-shelf components lashed together to provide quick results. All were unusually successful and demonstrated level flight launch and separation for both single- and two-stage missiles at both subsonic and supersonic speeds, automatic pitchup to ballistic trajectory angles, and ranges in excess of many hundred miles.

HUMAN BEHAVIOR RESEARCH

Mr. SHEPPARD. Would you explain your contract with the Mitre Corp. for studying human behavior in connection with air defense?

Mr. HORNER. The Mitre contract is a contract with the Massachusetts Institute of Technology which is supported by the Air Force to serve as a technical staff for the Air Defense System Integration Division. Part of the integration problem in air defense is to correlate the activities of the human operators with the very complex electronic gear of the semiautomatic ground environment. The efforts in human science are studies and experiments to determine what capacity the human operator has as a link in this semiautomatic ground environment and what degree of reliability and responsibility can be placed on the human operator.

CONTRACT FOR OPERATION OF ATLANTIC MISSILE RANGE

Mr. SHEPPARD. Mr. Golden, we asked yesterday, because of the interest of the committee, including the present acting chairman, that the contract existing by and between the Air Force and Pan American be brought to the committee so that we could have a chance to check it over.

Some questions have been in the mind of the committee relative to the potential liability involved by the Government in the suit pending, which I assume you are conversant with, and the contract, insofar as it is concerned will speak for itself. You are prepared to leave it here with the committee, as I understand. Is that correct?

Mr. GOLDEN. Yes.

Mr. FORD. Would it be wise for Mr. Golden to put on the record what his capacity is and his responsibilities?

Mr. SHEPPARD. I think that it would be quite proper at this time, and you may proceed to do so.

Mr. GOLDEN. I am General Counsel of the Department of the Air Force. I obtained the contract from the Air Research and Development Command yesterday and had an opportunity to look it over last night. It is a cost-plus-fixed-fee contract. As do all cost-plus-fixed-fee contracts, it incorporates by reference standard cost principles governing the whole Department of Defense. One of those cost principles states that salaries and wages, direct and indirect, of employees will be paid. The contract also has a standard Davis-Bacon clause in it. The contract also has attached, for each county in Florida, the prevailing wage rates established by the Secretary of Labor.

As each project for construction, alteration, or repair is determined upon by the contractor, and approved by the Air Force, we take a look at it and decide whether it is construction, alteration, or repair within the meaning of the statute. In addition, it must be over $2,000, consistent with the provisions of the Davis-Bacon Act.

If that is the case, the employees working on that particular construction, alteration, and repair receive the prevailing wage rate.

ALLEGED VIOLATIONS OF DAVIS-BACON ACT

Now, in this suit, as far as I have been able to determine overnight, the primary factor, I understand, relates to alleged violations by Pan American of the provisions of the Davis-Bacon Act. I am told that these relate to erroneous determinations by Pan American as to the coverage of a particular project under the Davis-Bacon Act, that is, it is alleged that Pan American decided it was not covered under the Davis-Bacon Act. The attorneys for these employees say that it should have been, and therefore a higher wage paid. In addition, there is an allegation that certain projects were split to keep them under $2,000.

Thirdly, I understand—but I have not had a real opportunity to verify this—that the attorney may be claiming that, even though any particular project is under $2,000, it is still subject to the Davis-Bacon Act because he looks at the contract as a whole and not each individual construction or alteration project.

Mr. SHEPPARD. Is it a year-to-year contract, or an open end contract?

Mr. GOLDEN. It is renewed each year at the beginning of the fiscal year.

Mr. SHEPPARD. Is it reasonable to assume in a contract running over a period of time that there is a continuity of the original concept? I mean by that when the parties enter into a contract from year to year then it becomes a cumulative contract rather than a specific contract, even though it is sectionalized in its functions.

Mr. GOLDEN. Yes. Sometimes you amend the contract each year, and it looks like a continuous contract on its face.

For example, that was done for the first 3 years, from 1953 to 1956.

Mr. SHEPPARD. There is a question that I would like to clear up. You say that it looks like a continuous contract. As long as the original contract is in existence, even though you amend it, it is the same contract unless it is terminated?

Mr. GOLDEN. Yes. The same provisions would apply to the extent that they are incorporated in the next year's contract.

Mr. SHEPPARD. That is right.

Mr. FORD. However, payments are made, I would assume, on the basis of the contract for each year—payments by the Air Force.

Mr. GOLDEN. Yes, as incurred, as vouchers are presented we pay off on the contract.

Mr. FORD. And you have a termination of Air Force obligations and liabilities on the basis of each contract which is a yearly contract?

Mr. GOLDEN. Yes, but a liability incurred in a particular year may still be outstanding the next year, or the year afterward.

Mr. FLOOD. No contract can be amended unilaterally?

Mr. GOLDEN. No, sir.

Now, if I may add one or two sentences in conclusion, I would be pleased to answer any questions.

It appears to me, in looking at the terms of the contract, as I have explained it here, if the plaintiff in this suit should prevail and the court determines that Pan American did not pay these people a proper wage, this would be a reimbursable item under this contract. There is no question in my mind as to that factor in respect to the Davis-Bacon Act.

Mr. SIKES. Before you leave that, do you mean that it would be a responsibility of the Air Force to pay the money?

Mr. GOLDEN. Yes; the theory being, if the wage was proper to begin with and we had agreed to pay proper wages under the terms of the contract, we would be legally required contractually to pick up this proper wage.

Mr. FORD. Is there a statute of limitations involved as to the Davis-Bacon Act and as to any obligations the Air Force has with Pan American under the contract?

Mr. GOLDEN. There is a 2-year statute of limitations. This suit was filed in June of 1958, and is retroactive to June of 1956.

AIR FORCE SUPERVISION OF CONTRACTOR

Mr. SHEPPARD. Let me ask you this question: What is the continuity of supervision given a contractor by the Air Force itself in order to see that the actual functions of the contractor are performed according to the interpretation of the Air Force and not necessarily that of the contractor?

Mr. GOLDEN. In an operation as large as this, we have an administrative contracting officer with a number of aides. I do not know the exact number in this particular project. He is supported by auditors. Subcontracts over certain dollar amounts require approval. For example, and only in this particular area, before any construction, repair, or alteration, even though minor, is undertaken by the contractor, he must, in most cases, notify and get the approval of the Air

Force administrative contracting officer. There is a slight exception for very nominal amounts under $500.

Mr. SHEPPARD. Here is what appears on the face of this, and I am not too familiar with the entire procedure:

It appears to be a violation which has been in existence for some time as the attorneys for the people who brought this action construe it. It is a continuous thing.

I am trying to establish how close we are to this kind of contractual procedure in avoiding a situation of this character wherein the Government might become involved in payments heretofore not anticipated.

I admit that, as long as the revision was in the contract originally to pay the funds under the Davis-Bacon Act, you could not avoid that in the final analysis, anyway. There is no way you could do that with the exception of the $2,000 limitation. Anything above that, you are required to pay.

Mr. GOLDEN. That is right.

Mr. SHEPPARD. How close are we to it? I understand this is one of those management contracts.

Mr. GOLDEN. Might I answer your first question first?

Mr. SHEPPARD. All right.

Mr. GOLDEN. I think our supervision has been very close from my review of this and from my prior knowledge of this contract, particularly in this construction area.

As a test of it, when this issue arose as to whether our projects under $2,000 were subject to Davis-Bacon, we discussed this and made a formal presentation to the Labor Department.

The Solicitor of Labor himself, Stuart Rothman, got interested enough to go down with our people to make an inspection of the job. He actually went out and saw the particular kinds of projects involved, and what is involved, in part, in this dispute. We have a formal opinion from him that the way we wrote the contract, the way we administered it with respect to the applicability of the Davis-Bacon Act to projects under this $2,000 limitation, is a proper one.

We always thought we were operating properly since the inception of the contract. He very recently gave us an opinion as to that point saying it was proper.

There may be differences of opinion as to whether a certain item was construction, alteration, or repair within the meaning of that law. There are always those kinds of arguments, whether, if you dab up a block house with some paint, that is construction or repair.

Generally, just dabbing a little bit of paint is not construction.

I understand, involved in this suit, there is that kind of thing. That may be an honest difference of opinion. You never can avoid those things completely, and to the extent there have been any of those—Pan-Am does not think there have been any—it would be a proper cost.

Our best analysis is that Pan-Am and we have worked so carefully on Davis-Bacon because of the inherent dangers of these labor disputes that we expect that our actions in this case will be justified in the lawsuit.

You can never tell, however.

POSITION OF AIR FORCE IF OUT-OF-COURT SETTLEMENT OCCURS

Mr. FORD. In the event the plaintiff and the defendant in this case feel that a settlement rather than a court decision is the desirable way to resolve the matter, does that settlement bind the Air Force?

Mr. GOLDEN. The contractor in that circumstance will clear this with the Air Force. He will do it for his own protection beforehand rather than having us postaudited and possibly disagree. The usual practice in that kind of case is—and I am sure it will prevail in this case—for him to present that offer of settlement to the Air Force.

Mr. FORD. The Air Force would have the opportunity, of course, to approve or disapprove from his point of view?

Mr. GOLDEN. That is right.

Mr. SHEPPARD. The responsibility, as I interpret it, Mr. Ford, is this: Once you enter into a management contract with a contractor, irrespective of who it may be, they immediately become the agent of the Federal Government, do they not, under the interpretation?

Mr. GOLDEN. Might I answer the second question which will answer this question as well?

You define this as a management contract? Mr. Horner knows more about what is done down there than I do, but I think it is in error to call this a management contract.

Mr. SHEPPARD. I did not define it a management contract.

Mr. GOLDEN. Somebody called it that.

Mr. SHEPPARD. We were told it was a management contract.

Mr. GOLDEN. I would like to correct that, too. I think to the extent there is management of the facilities, the range, the housekeeping, you call it management.

I have always understood that that was not the most important part of the work that Pan American does down there, and perhaps Mr. Horner has already explained that.

We have maintenance, operation, and management. Management relates really to housekeeping right down the range.

Mr. SHEPPARD. I do not want to differ with you necessarily, but hear this: When you enter into a management contract, you place the contractor in the position of an agent of the Federal Government even though his function is only one-third of the total. Is that right?

Mr. GOLDEN. Mr. Sheppard, technically and legally that is wrong. He is an independent contractor rather than an agent.

Mr. SIKES. Is it your position that the contractor was hired to do your housekeeping there rather than to run the base for you? Is that right?

Mr. GOLDEN. Yes, sir.

Mr. SIKES. You still manage the base. The contractor does the housekeeping. Is that your attitude?

Mr. GOLDEN. That is right.

Mr. SHEPPARD. Then the word "management" in this contract does not belong there.

Mr. HORNER. The distinction here is that he manages part of the facilities. He does not manage the program.

In that context there is management involved in this contract.

Mr. SHEPPARD. The question is where does he change his hat under the contract and become one as opposed to the other. That is how I look at it.

Tell me where that line of demarcation takes place.

You gentlemen are in the legal business. I am not. I have listened to a lot of controversy of management contracts. Once you write "management" into a contract it is hard to divorce yourself from it unless you define it.

Mr. HORNER. Managed by the Air Force.

Mr. SHEPPARD. You do not think you can remotely be construed as supervising the contract?

Mr. HORNER. Certainly there is an element of supervision involved, also.

AIR FORCE LIABILITY

Mr. ANDREWS. As I recall, that is a $68 million contract.

Mr. HORNER. That is the proposed level for fiscal year 1960.

Mr. ANDREWS. What will happen if Pan American has to pay out $1 million as a result of this lawsuit?

Mr. GOLDEN. If it is determined——

Mr. ANDREWS. Or $5 million, whatever amount they pay out?

Mr. GOLDEN. If it is determined by the courts that Pan American did not pay proper wages which they should have paid in the first place under the contract terms, we would have to pick them up.

Mr. SIKES. Is this a cost-plus contract?

Mr. GOLDEN. That is right.

Mr. SIKES. How long has this contract been in operation?

Mr. GOLDEN. Since July 1, 1953.

ATTEMPTS OF OTHER CONTRACTORS TO ENTER FIELD

Mr. SIKES. Have there been other contractors who have sought to negotiate for this same operation?

Mr. HORNER. I do not believe there have been others since the original selection of Pan American.

Mr. SHEPPARD. Off the record.

(Discussion held off the record.)

Mr. SIKES. The statement has been made to me, and I don't know how accurate, it is, that other contractors have sought to compete in this field and have been denied the privilege of doing so. Possibly these were small contractors who were not in position to do all of the work required.

Do you know about that?

Mr. HORNER. Yes, sir; there have been some cases where smaller contractors have proposed to do a portion of the work.

Mr. SIKES. Has it been your policy to have all of the work done by one contractor?

Mr. HORNER. I cannot say that has been our policy. We have, in some cases, let smaller contractors do certain elements of the work there.

Where the elements of work involve close integration with the overall range operation we felt it was necessary to have it under the management of one contract.

Mr. SIKES. Does this not constitute monopoly insofar as that contract was concerned?

Mr. GOLDEN. I don't like to use the word "monopoly." I would like to try to explain this more fully.

Mr. FLOOD. Mr. Sikes does.

Mr. GOLDEN. If you mean having gotten into an operation of this kind, as extensive as it is, that we are then necessarily compelled to renew something like this each year when they have proved their competence each year, the answer to the question is "Yes."

FEE PAID

Mr. SIKES. What is the fee you pay for this contract?

Mr. GOLDEN. Actually in our opinion the fee is quite low. This year it runs about 2.1 percent of the estimated cost.

Mr. SIKES. Do you have the cost and fee for each year the contract has been in operation?

(The information requested follows:)

PAA estimated costs and fixed fee as negotiated

Fiscal year	Estimated cost as per contract	Fixed fee	Total face value of contract
1954	$4,839,953	$215,000	$5,054,953
1955	11,727,507	440,000	12,167,507
1956	18,125,521	500,000	18,625,521
1957	43,160,029	1,030,000	44,190,029
1958	53,580,000	1,215,000	54,795,000
1959	[1] 70,617,620	1,400,000	71,017,620

[1] Includes latest contract amendments.

REASON FOR OPERATING RANGE UNDER CONTRACT

Mr. FLOOD. I am concerned with a far more fascinating facet of this. What in the world is Pan American going to show at all?

Mr. SIKES. Why was it considered desirable to contract this operation to Pan American rather than to operate these bases as others are operating?

Mr. HORNER. You will note from the initial date of the contract this was made at a time period when serious consideration was given to expansion of ballistic missile programs and a greatly increased range activity.

In order to run the ballistic missile program together with our other missile programs we could see that we had to have an extensive, instrumented range, range operation, data reduction analysis capability.

At this time in 1954 we did not have this capability in the Air Force and we did not foresee the possibility of training for this capability and providing this service——

Mr. FLOOD. Did Pan-Am have it?

Mr. SIKES. Pan-Am had to train for this operation just as the Air Force would have to train for it.

Mr. HORNER. Excuse me, sir. Pan-Am did not have to train for it to the same extent that we would have had to train for it.

Mr. SIKES. Where did Pan-Am have personnel in being with the knowledge required for this operation at the time the contract was made?

Mr. HORNER. Perhaps it would be worth while for me to explain in more detail what the operation is. It involves the maintenance of

bases, a large number of islands, instrumentation sites through the Central and South Atlantic, ending in the area of Ascension Island.

Mr. MINSHALL. In round figures how many bases is that?

Mr. HORNER. Right around 30.

In addition, they were to maintain and operate the data reduction, data analysis, technical range operation as at Cape Canaveral.

Mr. FLOOD. Don't forget the ships.

Mr. SIKES. Let him answer this question first, please.

Mr. HORNER. Pan American was only one of several contractors who were looked at in selecting a source for this work.

We found in looking at possible sources for this work that Pan-Am already had a very considerable capability in the areas of logistic support, maintenance and operation of bases, and especially bases in the tropical areas from their airline experience, Pan Grace, and Pan American World Airways.

They also made their proposal in concert with Radio Corp. of America, which they had proposed to treat as a subcontractor, to furnish the technical services.

Of course, Radio Corp. of America has had a vast amount of experience in electronic equipment and data analysis, computer handling, and all of the talents involved in the range techniques.

Mr. FLOOD. RCA is not the prime contractor?

Mr. HORNER. They are not.

Mr. SHEPPARD. Mr. Sikes has the witness. Let us be courteous enough to ask each other to yield.

Mr. SIKES. You were doing all of the things that you proposed to expand. You decided to ask for contract operations rather than to expand the operation yourself. Is that right?

Mr. HORNER. That is correct. I would point out that our range operation at that time was extremely limited. We had only a very short range capability appropriate to such missiles as the MATADOR, the initial BOMARC, and these kinds of short-range missiles which did not involve ranges of more than three or four hundred miles.

FIRMS INTERESTED IN ORIGINAL CONTRACT

Mr. SIKES. Who besides Pan-Am was invited to negotiate for this work?

Mr. HORNER. We have a list here.

Mr. GOLDEN. I have some history on this. Forty-five interested firms were invited to send representatives to the test center to consider undertaking this job. Some dropped out, some were eliminated clearly.

Eventually six companies' proposals were considered.

Mr. SIKES. Who were they?

Mr. GOLDEN. Pan American and RCA, a joint proposal.

Next was Fairchild Engine & Airplane Co.

Land-Air, Inc.

Day & Zimmerman, Inc., in conjunction with Philco and Trans-Ocean Airlines.

Next was Federal Telephone & Radio.

The last was Paul Smith Construction Co.

Mr. SIKES. Were all of those actually allowed to submit bids?

Mr. GOLDEN. Yes, sir.

Mr. SIKES. Was Pan-Am the lowest bid or in your opinion the best bid?

Mr. GOLDEN. I cannot give you the details of that. I can only indicate again from researching the records——

Mr. SIKES. You can supply that information?

Mr. GOLDEN. I believe we can.

(The information requested follows:)

PAN-AM-RCA CONTRACT

Historical contract file records indicate that the Pan-Am-RCA proposal was the best bid.

Excerpts from historical records indicate that an evaluation project group established subpanels to evaluate individual elements of each contractor's proposal. Elements examined and evaluated were: (*a*) Supply; (*b*) air support; (*c*) management; (*d*) technical systems planning; (*e*) photographic services; (*f*) data acquisition; (*g*) data reduction; (*h*) phase-in period; (*i*) range operations planning. Finally, overall panels composed of senior officers reviewed the evaluations of each of the subpanels and selected Pan-Am.

While costs were considered, it was recognized that a cost-plus-a-fixed-fee contract was involved and the Government would, therefore, be required to bear all costs incurred regardless of original estimates proposed by each contractor and contained in any contract written. In addition, the proposals varied extensively as to method of operation and manpower requirements so as to make cost comparisons an impractical basis of evaluation. The other factors, as described above, relating to technical, operational, and logistical areas, became the primary basis for evaluation and award.

Mr. MINSHALL. What were the mechanics of notifying these 45 interested companies?

Mr. GOLDEN. I cannot answer it particularly. As indicated——

Mr. HORNER. I can, Mr. Golden.

We had had a technical study of the range needs which resulted in a report.

From the report we made a general determination as to what the requirements were going to be, and then we went to our procurement bidders' list which identifies all American industry and their capabilities, and advertised to them what the need of the task was and asked them to express their interest.

Mr. MINSHALL. You advertise to those on the procurement bidders' list?

Mr. HORNER. That is correct.

Mr. SIKES. Have there been inquiries from interested bidders since the initial contract was let?

Mr. HORNER. Not to my knowledge, no, sir.

Mr. SIKES. What has happened to the inquiries from the smaller bidders who sought to undertake part of the work?

Mr. HORNER. Wherever it has been possible to make a separate contract determination for work that is not so closely related to the overall range operation, we have tried to give work to the smaller bidders in each case.

Mr. SHEPPARD. This committee will stand adjourned until 2 o'clock.

AFTERNOON SESSION

Mr. MAHON. Gentlemen, we will resume the hearing.

Mr. Sheppard, who handled the committee this morning, had recognized Mr. Sikes, I believe, before noon. Will you proceed, Mr. Sikes.

Mr. SIKES. Thank you, Mr. Chairman.

We were discussing the Pan-Am contract at Cape Canaveral.

FEE PAID PRIME CONTRACTOR ON SUBCONTRACT FEES

On the subcontracts or participating contracts by other agencies or other organizations, what is the profit situation or the fee situation insofar as they are concerned?

Mr. GOLDEN. I can give it to you, Mr. Sikes, with respect to RCA, but that is about all I have. I checked that, and actually RCA is getting a fee on the work it does that is $800,000 on estimated costs of $23,944,728, for a percentage of 3.34 percent.

Mr. SIKES. Is that fee and that charge included in the contract charge of Pan-Am to the Government?

Mr. GOLDEN. It is. That fee and the costs are included in the $68 million that was discussed here.

Mr. SIKES. Does Pan-Am then draw a 2-percent fee on the money paid to RCA?

Mr. GOLDEN. Yes, it does; the 2.1 percent figure is derived from applying the total dollar fee to the total estimated costs under the contract.

Mr. SIKES. Do they also draw a fee on the fee paid to RCA?

Mr. GOLDEN. In effect, yes.

Mr. HORNER. That is taken into consideration in establishing the fee for the prime contractor.

Mr. GOLDEN. You will find if you just took the work that Pan-Am does, the direct work it does, the fee has averaged about 4 percent on its own work.

Mr. SIKES. Apparently you have had an unusual number of labor problems at Patrick and at Cape Canaveral. Is that true?

Mr. GOLDEN. Most of the labor difficulties at Patrick, Mr. Sikes, I think have been in relation to construction programs rather than to the operational program.

Mr. SIKES. Then is it true that those problems did not enter into the Pan-Am contract?

Mr. GOLDEN. That is correct.

SUIT FILED

Mr. SIKES. On the controversy which now is pending regarding possible underpayment of workers under the Pan-Am contract, it is my understanding that a suit has been filed in the U.S. district court at Orlando, in behalf of some 466 employees of Pan-Am, alleging failure on the part of Pan-Am to live up to contract requirements, notably Davis-Bacon requirements, in work at Patrick and Cape Canaveral. Is that correct?

Mr. GOLDEN. That is correct.

Mr. SIKES. When was that suit filed?

Mr. GOLDEN. I believe it was June of 1958.

Mr. SIKES. Am I correct in that come $6 million is involved in that suit?

Mr. GOLDEN. I understand that is what the plaintiffs allege. Our estimate is somewhat lower than the plaintiffs' claim.

Mr. SIKES. What is your estimate?

Mr. GOLDEN. We have a range of estimates. The union, for example, estimates that it will run from $6.5 million to $10 million. We estimate between $3 million and $6 million, and probably in the lower range.

STATUS OF LAWSUIT

Mr. SIKES. What is the present status of that suit?

Mr. GOLDEN. I do not have the technical status as to whether the answer has been filed. I can supply it for the record, if you wish. Time does not permit.

Mr. SIKES. Will you do that?

(The information requested follows:)

STATUS OF LAWSUIT

Pan Am is now in the process of reviewing the pleadings and pretrial procedures preparatory to the actual trial on an amended complaint of the plaintiffs. On June 23, 1958, Pan Am moved for dismissal of the original complaint. The presiding judge granted the motion but permitted the plaintiffs 30 days to amend their complaint. On March 12, 1959, Pan Am filed an answer to the amended complaint, again asking for dismissal. The amount of judgment asked by the plainffs is $6,200,000 plus interest, attorney fees, and cost.

ALLEGATIONS OF LAWSUIT

Mr. SIKES. I believe it is alleged that actual construction has been done under the contract under the term "maintenance" and therefore the workers claim they are entitled to Davis-Bacon wages which they were not paid. Is that correct?

Mr. GOLDEN. Yes; that is correct. That is, they allege so.

Mr. SIKES. Yes; I understand.

Is it also true that the suit alleges that Pan Am has actually done construction piecemeal in that the suit states that Pan Am will do $1,800 or $1,900 worth of work on a project, quit the project for a matter of weeks or months, come back to the project, pick up and start again where they left off? The suit alleges that Pan Am was using that subterfuge to avoid payment of the Davis-Bacon wage scale. Is that correct?

Mr. GOLDEN. The suit so alleges, Mr. Sikes.

Mr. SIKES. Are you sufficiently familiar with the situation to comment on that matter?

Mr. GOLDEN. I am not familiar at all with the details. We are in the process now of getting the information, that is, Pan Am is in the process, and we obviously have a great interest and will watch that situation. I am informed that our supervision has been pretty good on this, and that artificial divisions to get it below $2,000 is not correct, but I am not prepared to say whether it is or is not at this time.

Mr. SIKES. Of course, this committee is concerned about fair treatment and proper compensation for the workers. What is the probability that the Government would have to assume the indebtedness if it were determined there is an indebtedness? Do you feel that in any way this contract could have been written differently in order to insure against that?

Mr. GOLDEN. No.

Mr. SIKES. Or that the supervision on the part of the Air Force could have been such that this situation would not have arisen?

Mr. GOLDEN. I think your question assumes the situation exists. I do not think the contract would have been written differently. I think it is a question of administration. I hope our administration has been good along with Pan Am's so the plaintiffs have no case.

Mr. SHEPPARD. Will the gentleman yield at that point?

Mr. SIKES. Yes.

Mr. SHEPPARD. I do not know that it is the practice, but if there should be a practice wherein project "A," for example, is being kept within a limitation for whatever purpose it may have been kept there, and they break away from that job and then come back to it later, there are obviously some additional costs involved there. There would have to be.

Mr. GOLDEN. Yes, sir. If there has been this artificial division of a single project, it is reprehensible. I hope you appreciate I have had only overnight to become familiar with this matter. I talked briefly to the people who might be involved, and they told me of a situation where a project had started for $1,800 without Davis-Bacon coverage, and then subsequently we found out there was a few hundred dollars more work to do, we added this to the project and then paid Davis-Bacon retroactively to the beginning. I indicate this only to show you that there has been this attempt at careful compliance with Davis-Bacon, and I have an actual case where that happened. It was brought to my attention.

POSSIBLE ARTIFICIAL DIVISIONS TO KEEP PROJECTS BELOW LIMITATIONS

Mr. SHEPPARD. Assuming that the condition to which Mr. Sikes has been addressing himself, that is, the breaking of the continuity of contract completion, and again assuming that we have the supervision on the part of the Air Force which it has been testified we have there, how could the continuity of an indiscretion of that character be created without the Air Force knowing it?

Mr. GOLDEN. It should not arise. There are elements of good faith. It is hard for me to believe this happens because (1) I see no advantage to be gained by the contractor here, and (2) I do know that they have very detailed rules with respect to notification and approval by the Air Force of these matters, project by project. It seems to me if we watch every repair job from $500 and up, we are watching a lot of small projects requiring a lot of supervision, and errors may occur.

DISTINCTION BETWEEN CONSTRUCTION AND MAINTENANCE

Mr. SIKES. What is the factor of determination by which it is decided that one job is a maintenance job and another job is a construction job? Under your maintenance and operation contract the controversy has arisen that what the contractor called maintenance is in fact construction. What has been the definition heretofore which normally would govern that type of operation?

Mr. GOLDEN. Our people try and should follow the regulations that the Department of Defense has outstanding on this, which, for the record are Armed Services Regulations section 12–400. We have several paragraphs in that regulation to describe what is construction, alteration, repair, and what is not. I know from my own experience that the distinction is not always easy, is not always obvious. I think

in checking with the Labor Department you will find that they have many cases of differences of opinion as to which is which.

I would suspect that in an operation of this kind, the chance for difference of opinion is considerable. We have situations where, even in supply contracts, incidental construction or incidental installation of heavy equipment is not considered to be under Davis-Bacon, and the Labor Department goes along with that. We do, however, have differences of opinion from time to time.

Mr. SHEPPARD. When you formulate your budget at its inception upon Base "X," someone there, presumably your resident engineer, whoever he may be, in making the presentation for the budget, it has been my understanding, at that point in time draws distinctions between construction money and maintenance money. So when the budget comes up from the field, there is a definition of the two expenditure requirements. Where is it separated, by interpretation, from that point on until it gets to the status of not being defined? If it is good enough at the beginning, it ought to be good enough to carry on to the terminus.

Mr. GOLDEN. I can start the answer, and I hope there are people more knowledgeable here who can help me out.

Actually, so there may be no misunderstanding, most of the construction work is done by the Corps of Engineers. Our policy with Pan Am is to do everything we can outside the Pan Am contract that relates to construction, alteration, or repair. We have to keep a limited capability there to do this emergency construction, alteration, and repair—something which comes up in a hurry, building a big mound to put some camera on quickly; or, after a launch, to do something quickly to get ready for the next one. Pan Am does only the very small ones, and also those constructions, alterations, and repairs which have to be done in emergency situations.

Primarily, the major construction and the major part of the money for construction flows through the Corps of Engineers.

Mr. HORNER. And the Bureau of Yards and Docks.

PAYMENT OF FEE TO PRIME CONTRACTOR ON SUBCONTRACT FEES

Mr. SIKES. You testified that Pan Am in effect is paid a fee on the fee which is paid to RCA. Is that customary when there are prime and subcontracts throughout the Government?

Mr. GOLDEN. Yes. However, note that the normal production contract, when you negotiate and the fellow tells you what the job is worth, includes subcontract prices. I do not like the label fee on fee.

Mr. SIKES. That is what it is.

Mr. GOLDEN. Technically it is a fee on the subcontract price, and that includes a fee; to that extent it is correct.

What we do, particularly in a case like this, is take account of the fact that RCA has a big hunk of this contract, and we do not allow Pan Am the same degree or order of magnitude of fee on the subcontract as on their own direct work. This is why the fee is quite low.

May I add one other thing, Mr. Sikes?

Mr. SIKES. Yes.

Mr. GOLDEN. I also have this figure, which is interesting. If you totaled Pan Am's and RCA's dollar fees and then applied them to

the total cost of the contract, the total fee for both of them is 3.1 percent.

Mr. SHEPPARD. May I inject one question at this point.

I think, Mr. Golden, you are correct, with this possible addition: In this instance, RCA is doing a large amount of gross business for the Government, and when RCA goes into its renegotiation, it is renegotiated on the gross income for the year and not on specific contracts.

Mr. GOLDEN. That is right.

Mr. SHEPPARD. So in reality, whatever the cost might be in this subsidiary function, they are assured of their overall percentage, irrespective of what this may be and on top of that.

Mr. GOLDEN. Yes. It is all lumped together and taken into account on an annual basis.

Mr. SHEPPARD. So in the final analysis, as I interpret the picture, it merely indicates exercising as close scrutiny as we can to keep away from that kind of contract, because you are in a cumulative situation against which, under existing law, you cannot very well protect yourself.

Mr. GOLDEN. This is not peculiar to this contract.

Mr. SHEPPARD. No. It is universal. This is merely a contributing factor toward a total in this general field. We cannot stop any contractor from bidding the low price in any particular case for whatever reason he chooses to bid it.

CONTRACT OPERATION OF AIR FORCE BASES

Mr. SIKES. If the Air Force were to plan again to review its operation at Patrick and Canaveral, would you still seek to do it by contract, or would you prefer to do it through your personnel under Air Force supervision?

Mr. HORNER. We know of no reason at this time that we would change the system.

Mr. SIKES. Are you expanding contract operations to other bases?

Mr. HORNER. This happens to be our largest contract of this nature. We do have a contract with Aero, Inc., at the Arnold Engineering Development Center, of about one-third this size.

Mr. SIKES. What about Vandenberg?

Mr. HORNER. Vandenberg, sir, is an operational site, and it is manned by operational Air Force people.

Mr. SIKES. In the main, is there not great similarity in the work to that done at Patrick?

Mr. HORNER. No, sir; I am sorry; it is quite different. The only firings conducted at Vandenberg are those of a training nature, and they are conducted for the purpose of training Air Force operational people. The Vandenberg site, you might say, is an instrument of actual warfare. It is an operational base.

Mr. SIKES. In your opinion, does this constitute an unusual operation for which contract housekeeping appeared to be the best solution?

Mr. HORNER. Yes, sir.

Mr. FLOOD. Will the gentleman yield?

Mr. SIKES. Yes.

Mr. FLOOD. The shots that you have been making recently at Vandenberg are customarily identified with an operational base?

Mr. HORNER. Are you referring to the DISCOVERER shots?

Mr. FLOOD. Of course.

Mr. HORNER. Actually, those are being performed on the Pacific Missile Range under the management of the Navy. The actual launch that was made the other day does happen to be on Vandenberg, purely as a matter of available real estate.

Mr. SHEPPARD. And facilities.

Mr. HORNER. Launch pad. It takes quite a different kind of stand from the operational stands. The actual range operation is carried out as a responsibility of the Navy in this case.

Mr. FLOOD. If the gentleman will yield further, I don't think there is much use in pursuing this subject under this hearing any further today, but I do contend that this is the kind of problem that should call for a full and special investigation to determine the matter of policy at Defense and Air Force level, first, on the continuation of a contract at this base in Florida, and secondly, because of the manner in which the state of the art has advanced so rapidly at the Florida base that it is about as close to operational as Vandenberg. How long further should this be under civilian control? Should it have been in the first place? How has it been examined? What is to be the policy of Defense and Air Force vis-a-vis this kind of situation as it exists now and from now on in?

That should be a special full-dress investigation by a subcommittee which I hope will be chaired by the gentleman from Florida, Mr. Sikes.

USE OF GULF TEST RANGE

Mr. SIKES. What use do you plan to make of the gulf test range in the Gulf of Mexico, which is substantially complete and which represents an outlay of a substantial sum of money?

Mr. HORNER. We have a very considerable installation at Eglin Air Force Base, which is the head of the gulf coast test range. Because of the constraints of geography there, we have assigned certain types of projects, and we foresee right now the continued test of the BOMARC missile there, the use of the gulf coast range in BOMARC training and operational development, together with the SAGE and ground environment for that missile.

We plan on using that center as a development test location for the HOUND DOG missile. In connection with its operational development mission, we of course conduct operations suitability tests of all of our weapons there.

Mr. SIKES. It has been my understanding that it is not now being operated at capacity. I would hope that the situation in the future will show operation at capacity because this has involved a very large expenditure of funds.

Mr. HORNER. Certainly one of our major problems is tailoring facilities construction to exactly fit capacity. It is very hurtful to our programs to fall short in our planning. Leadtimes are such in creating facilities that you have to plan some years in advance for a facility in order to have it adequately available for the research and development program.

You can see that this situation might possibly create a circumstance where a facility would be built of greater capacity than we actually need in carrying out our research and development program.

I am not suggesting that this is the case at this time at the gulf coast test range.

Mr. SIKES. Do you propose to use it to capacity?

Mr. HORNER. We propose to use it for all the programs that are suitable to test there. I think you probably might find a difference of opinion as to precisely what the capacity is. Obviously it is not desirable for us to make work for the center in addition to that work which we need to put there in order to get our development program completed.

Mr. SIKES. You have not answered my question. I assume that it was anticipated there would be a need for it to be operated at capacity when you built it, in order for Congress to justify the money for the construction; is that correct?

Mr. HORNER. Yes, sir.

Mr. SIKES. Has anything happened to change that view?

Mr. HORNER. Yes, sir.

Mr. SIKES. What?

Mr. HORNER. We have had marked changes in our research and development program since the construction began. We have had such changes——

Mr. SIKES. This expenditure was justified by the Air Force on the basis of essentiality and was so funded by Congress. I still have to learn whether the gulf test range will be operated at 10 percent of capacity, 50 percent of capacity, or 100 percent of capacity. Can anyone get that information for me?

Mr. HORNER. We can give you a detailed rundown of the test programs which we will have at the gulf coast. In view of the fact that it might be difficult to reach agreement as to exactly what its capacity is, it is very hard to put it in percentage of capacity. I can provide for you a detailed listing of all of the work that we propose to do at the gulf coast test range.

Mr. SIKES. Will you also provide the estimated percentage of capacity at which it will operate?

Mr. HORNER. Yes, sir.

(The information requested is classified and has been furnished for the committee's use.)

AIR FORCE RESEARCH CONTRACTS OUTSIDE OF THE UNITED STATES

Mr. SIKES. There was a story in the morning newspaper concerning a paper presented before the World Congress of Flight in Las Vegas by the Air Research and Development Command. The paper reported on experiments conducted in Europe by "leading scientists" under Air Force contract on processes underlying human thought and action, that is, the nature of the brain and the central nervous system. The paper was presented by a major of the European Office of ARDC. How many personnel are in the European Office of ARDC?

Mr. HORNER. The paper was presented by Major Griffin, who is Deputy for Research Operations in the European Office at Brussels. We have at the present time approximately 53 people there.

The mission of the center is to contract for research in European sources. This paper was presented as a result of one of those contracts.

Mr. SIKES. Mr. Chairman, for the information of the committee, the article referred to starts out in this order:

Budget watchers may be momentarily dismayed to learn that the Air Force has been financing reading lessons for octopuses. They may also bridle at finding Air Force funds allotted to studies of the beetle's eye.

And so forth and so on.

I have two such articles which I hand to the chairman for inclusion in the record if it appears justifiable. I am sure there is good reason for this. The discussion can show the reason back of the articles and the studies.

Thank you, Mr. Chairman.

(The newspaper articles referred to follow:)

[From the Washington Post and Times Herald, Thursday, Apr. 16, 1959]

NORMAL BRAIN FUNCTION BLAMED IN 'PILOT ERROR'

(By John G. Norris, Staff Reporter)

LAS VEGAS, NEV., April 15.—Absentminded professors and inattentive husbands now have some valid scientific evidence on their side.

Results of some recent Air Force-sponsored research disclosed here today strongly indicated that the blame for an "addled" professor's walking into a bus or preoccupied husband's failing to hear what his wife has to say may be placed on the natural functioning of the human brain and central nervous system.

A report made before the World Congress of Flight by the Air Research and Development Command declared that experiments conducted in Europe by leading scientists under Air Force contract indicate that pilots, concentrating on one pressing current problem, can become temporarily blind and deaf to warning signals owing to a natural block between the outer and inner brain.

It said that aircraft crashes blamed on pilot error due to absentmindedness or inefficiency may well be attributed to a deficiency in the very nature of the brain and central nervous system.

BRAIN "SECRETS" SOUGHT

A paper presented by Major Ralph O. Griffin, USAF, of the European office of ARDC, reported on experiments made by Doctors Jouvet of France and Sem-Jacobsen of Norway under the Air Force contract, in what he called an attempt to discover the "secrets" of the human brain, aimed at advancing the USAF space program.

Data presented, he said, "are regarded as a major breakthrough permitting some significant conclusions to be drawn concerning some of the processed underlying human thought and action."

Seventy-five hundred delegates to the World Congress of Flight spent the morning at an Air Force gunnery range watching exhibitions by American and Allied precision flying teams and a bombing and fly-by demonstration of all of the Air Force's current fighters and bombers. In the afternoon, there were panels on international research, use of airspace and air and space communications.

[From the New York Times, Thursday, Apr. 16, 1959]

AIR FORCE AIDING UNUSUAL STUDIES—OCTOPUSES AND BEETLES MAY YIELD VALUABLE DATA TO RESEARCH EXPERTS

(By Richard Witkin)

LAS VEGAS, NEV., April 15.—Budget watchers may be momentarily dismayed to learn that the Air Force has been financing reading lessons for octopuses.

They may also bridle at finding Air Force funds allotted to studies of the beetle's eye.

Yet it is from unlikely projects such as these that some of the more valuable advances in aeronautics and allied arts frequently emerge.

This was made clear in presentations made today by the Air Research and Development Command before delegates attending the week-long World Congress of Flight.

Studies of the beetle'e eye, it turns out, have provided a wiring diagram for a "radical new type" of airspeed indicator.

REPORT CARDS AWAITED

The report cards are not all in yet from the school for octopuses. But there is some grounds for hope that the program will make possible the design of airborne computers with the ability to perceive and remember shapes.

Such computers apparently would be highly useful in reconnaissance from planes or satellites.

The man who has directed the better reading course for octopuses is J. Z. Young, a London university professor. He has spent the last few summers in the basement of the Naples aquarium teaching these creatures "how to distinguish between various remarkably similar letter-like shapes."

A companion in Professor Young's research group has actually made a model of a computer "whose capacity to perceive and remember shapes approaches that of the octopus."

Another member of the group believes that the octopus uses a system for recognizing patterns that is "simpler and more economical in components" than the system hitherto proposed for airborne computers.

Compactness is a prime requirement in design of such gadgets because the large amount of rocket power needed to launch relatively small packages of research instruments.

The octopus study is but 1 of 140 projects financed in allied nations by the Air Force Research Organization.

Mr. SIKES. How much money is programed in fiscal year 1960 for personnel and all other costs of the European office of ARDC?

Mr. HORNER. $500,000. This includes military pay (23 officers) flight pay, travel, office rent, automobiles, American personnel, indigenous personnel, supplies, administrative support by Embassy, etc.

Mr. SIKES. What is the number and cost of all ARDC contracts in force and planned for fiscal year 1960 in Europe?

Mr. HORNER. There are 334 contracts for a value of $6,996,000. This same level of effort is planned for fiscal year 1960.

Mr. SIKES. Provide for the committee a list of all countries in which the Air Force has placed research contracts.

(The following list was provided:)

Austria	Iceland	Sweden
Belgium	Israel	Switzerland
Denmark	Italy	Turkey
France	Netherlands	United Kingdom
Germany	Norway	
Greece	Spain	

Mr. SIKES. Discuss the background of the studies to which I have referred.

Mr. HORNER. The purpose of such bioscience studies is to determine, from relatively simple structures, the methods by which they operate and relate such knowledge to existing Air Force problems. In the case of the octopuses' brain, many subjects having partially damaged portions suggest a logical deduction mechanism which offers possibilities for complex computer applications. Similarily, the detection and coordination systems of insects offer possibilities for equipment based on new principles. Thus the beetle's eye studies have revealed that the beetle lands by evaluating his speed relative surrounding objects by a mathematical process known as autocorrelation. These studies have resulted in the design of a landing speed indicator operating on this principle which is scheduled to be tested shortly in an aircraft.

In the total active program from the European office of ARDC at the present time, which amounts to about $7 million, there are contracts, as I recall, with some 16 different countries.

Most of the contracts are with NATO countries, but we do have a very significant contract loading outside of NATO in free Europe.

The effort is to procure the best possible scientific talent in Europe. The program has been extremely remunerative in results for the dollars invested. Most of the contracts are for very small amounts, ranging from $1,000 or $2,000 up to, in a very limited number of cases, hundreds of thousands of dollars where there is some hardware development.

The economic system in Europe at the present time is in such status that there are many extremely competent scientists who cannot be supported from the European defense program or the European scientific program. We do not hire this scientific talent out of context with our present program. As a matter of fact, we do not allocate any money whatsoever to the European office for supporting these contracts. Every contract proposal which is submitted to our staff in Brussels is sent back and evaluated in terms of the possibility of buying such effort here in the United States. It is only when it is found by our management in this country that we can get superior value for these investments in Europe, that we support the European contracts.

On this basis, we have had a very high return per dollar from our European science program.

POSSIBLE USE OF COUNTERPART FUNDS TO FINANCE RESEARCH CONTRACTS

Mr. FORD. May I ask a question at this point, Mr. Chairman.

I presume that the reimbursement for these contracts comes from U.S. dollars.

Mr. HORNER. It does.

Mr. FORD. Have you ever explored the possibility of counterpart funds?

Mr. HORNER. We have explored this possibility, and we have not finished with the exploration of this possibility. There are some administrative complications is using counterpart dollars.

Mr. FORD. It would appear to me a very legitimate area where we might utilize effectively some of the vast resources which are not being utilized today, and in effect lessen the burden on our own U.S. dollars at home.

Mr. MINSHALL. What would be the major administrative difficulties in using counterpart funds?

Mr. HORNER. This has varied over the years. The European office of ARDC was established, if my memory serves me right, early in 1953. At that time our management complex was somewhat different than it is today. As I understand it, the law which governs the administration of counterpart funds has been changed in succeeding years. Also, since that time there has been a much wider recognition of the international character of science. There has been a NATO Chief Scientist appointed, in effect, under the Secretary-General of NATO. There has been an effort to bring all of these international science programs together.

In this kind of environment, there is more incentive to try to use some international financing structure, if I may use the term, such as counterpart funds, to serve this purpose. It is international in terms of the U.S. administration of it.

Mr. MINSHALL. But specifically you have no examples——

Mr. HORNER. I cannot give you any reason why counterpart funds cannot be used; no, sir.

Mr. MINSHALL. Thank you.

Mr. FORD. It seems to me from past experience on the Mutual Security Appropriation Subcommittee, that the State Department has been very reluctant to authorize the utilization of these funds for any purpose other than the kind of programs they want to manipulate, and I wonder if they are roadblocking you in this regard.

Mr. HORNER. I cannot say that the State Department is roadblocking the use of these funds. I would only point out that now we are getting into a little different area. The basic science program that Mr. Sikes asked the initial question about and the chairman enlarged upon, is not a part of the military assistance program. These are paid for out of Air Force appropriated moneys.

The mutual weapon development program is paid for out of military assistance program funds, and, of course, counterpart funds, in their current administration, are likewise under the joint administration of the State Department.

So there are additional administrative, management bases to touch in considering the possibility of using counterpart funds to support military departmental research programs that are sponsored in Europe.

Mr. FORD. I fully appreciate that the military assistance program is quite different from the problem Mr. Sikes raised here, but I always go back to the attitude of the State Department. They zealously guard the utilization of these funds for anything other than what they want to spend them for as they see fit for the implementation of their program. We find many instances where they just refuse to let anybody else come in and utilize these vast resources which have been built up over a period of 10 or 12 years.

I think this appears to be a very legitimate area where our own military budget can gain some advantage, and at the same time have no adverse impact on the program you are trying to execute.

So I sincerely suggest, Mr. Chairman, that if Mr. Horner and his people need any push to get this result, we give a big assist in every way we can.

(Discussion off the record.)

USE OF BERYLLIUM

Mr. ANDREWS. I have just one question of General Wilson.

You pointed out the advantages you get from using a beryllium nose cone over copper or any other type.

General WILSON. Yes.

Mr. ANDREWS. Do you have these beryllium nose cones in production now?

General WILSON. No; we do not. We were showing you research into certain areas in metallurgy. The time may come when this could be a possibility. At the moment we have simply demonstrated the feasibility of using beryllium for machine parts.

Mr. ANDREWS. What are you waiting on?

General WILSON. Probably new design requirements.

Mr. ANDREWS. Do you have a sufficient quantity of beryllium?

General WILSON. Beryllium is fairly scarce and very expensive.

Mr. ANDREWS. Where do you get it?

General WILSON. Its principal source at this time is Brazil.

Mr. ANDREWS. Are you stockpiling any?

General WILSON. Yes. It is a strategic material.

Mr. ANDREWS. Do you think you have enough on hand, or can get enough, to produce enough nose cones, or as many as you need?

General WILSON. I just do not know what our source is, our supply. I can get the answer for you.

(The following statement was submitted.)

On the basis of presently anticipated needs for all uses, the quantity of beryllium available is more than adequate for the following reasons:

(*a*) At the present rate of consumption, reserves and resources are underused.

(*b*) Production capability is twice current production quantity.

(*c*) Predominately, only one source (Brazil) of several known sources of beryllium is being utilized.

(*d*) Three-year projection of requirements are revised each 6 months to keep pace with advancing technology and new applications.

Mr. FLOOD. What is the status of your research and development, if you have any status, on beryllium for aircraft construction, airframe construction? What is your research and development showing with reference to its toughness as against stainless steel and its weight and all the virtues that might make it very desirable? Where are you on a fracture point problem?

General WILSON. All of these properties are being investigated.

Mr. FLOOD. I know that. I said, What is the status of your investigation?

General WILSON. We already know it is more rigid than stainless steel. It is lighter than magnesium. We know that it has poisonous properties. It is difficult to machine.

Mr. FLOOD. Toxic properties?

General WILSON. Yes. We also know alloyed with steel it provides a very fine structure material. Our studies in the whole metals area, which includes beryllium, still find new ways to use it and refine it.

Mr. FLOOD. I have heard this for several years and it strikes me some special attention should be given to this metal which all of your people tell us here you have such an exciting possibility, and yet you seem to be giving it rather routine attention.

General WILSON. I would not say it is routine.

Mr. FLOOD. I said that.

General WILSON. Yes. It would appear to be routine. It is really receiving considerable emphasis as are all the materials; and renewed emphasis this year, incidentally.

EVALUATION OF BOMARC

Mr. FLOOD. Mr. Secretary, I tried to reach the Chief of Army Research and Development over the lunch hour and I could not find him.

Your anything but frank conclusion that the Air Force does not want any part of Army's NIKE–ZEUS causes me to be curious about the Air Force's BOMARC operation.

The Secretary of Defense when he was here earlier in the year told us that he got the greatest possible collection of hair and brains that he could get together to evaluate and analyze, so on and so on, and that is why they did not get any money for hardware on NIKE–ZEUS. I think that Mr. Mahon conducted the examination.

Now I know this question should be for the Secretary, but insofar as you are concerned as Chief of Research and Development, has the Secretary of Defense ever asked you to collect an equally high level amount of brains and whatnot, for the purpose of evaluating BOMARC?

Mr. HORNER. The Secretary of Defense has not recently asked us to do that; however, he has done it. Your question happens to be very timely in that a committee of scientists has just completed a very comprehensive and extensive technical review of the BOMARC program.

Mr. FLOOD. Why in the world did not someone tell me that before? We have had everybody from three branches of the service here and now I stumble on this. What happened?

Mr. HORNER. I cannot answer your question.

Mr. FLOOD. We will have to get it from someone else.

Will we have the Army research and development people coming up sooner or later?

Mr. MAHON. Yes.

Mr. FLOOD. I am going to ask them the same kind of questions, since you have been so frank about their pigeon. I am going to give the Army a chance to shoot down your pigeons because that is the kind of game you seem to be playing around here. I have always felt that BOMARC is point to point and you should not have it anyhow.

TOTAL COST OF BOMARC

What is the total cost of this BOMARC system today? If you cannot give it to me now, put it in the record. How much has been spent to date on the BOMARC program?

General FRIEDMAN. I would say $1.613 billion for procurement through fiscal year 1959.

Mr. FLOOD. How much has been spent altogether on the BOMARC system, not procurement?

General FRIEDMAN. I do not have it added here.

Mr. FLOOD. I got the figure of $2 billion from somebody.

Mr. HORNER. A little over $1 billion at the present time.

Mr. FLOOD. I got the figure of $2 billion from my secretary about half an hour ago.

General FRIEDMAN. About $1.5 billion.

Mr. FLOOD. I just picked up $500 million in 30 seconds.

Mr. HORNER. It depends on whether you include the money in the current year's program.

Mr. FLOOD. You know what I include. Make it a nice big, round, educated figure. Will you raise it to $2 billion?

General FRIEDMAN. Through the fiscal year 1959 my arithmetic indicates $1.864 billion. That includes the procurement, research and development, the construction, maintenance and operation, and the cost of military personnel assigned to the program from the period approved.

Mr. MAHON. General, will you check your figures and make them specific and inclusive at this point in the record?

General FRIEDMAN. I will do that.

(The requested information follows:)

COST OF BOMARC

The amount of funds spent on the BOMARC system through fiscal year 1959 total $1.864 billion and includes the cost of research and development, procurement, maintenance and operation, construction, and the cost of military personnel assigned to this program.

Mr. MAHON. Will you also include a statement as to whether or not you are talking about funds spent or funds obligated or pledged against this account? Make it perfectly clear.

General FRIEDMAN. Yes.

(The information requested follows:)

FUNDS FOR BOMARC

The amount of $1.864 billion represents funds obligated for the BOMARC system in fiscal year 1958 and prior years and programed during fiscal year 1959.

Mr. FLOOD. I cannot remember where I got the $2 billion figure. It was from a top man in the early days.

OPERATIONAL DATE

Now, how many squadrons of BOMARC as of this morning are operational for either $1.5 billion or $2 billion? The Air Force has spent $1.5 billion or $2 billion, depending upon whose figure we take. That is a lot of money even for the Air Force. How many squadrons of BOMARC are operational for all of that dough over all of these years that we have been working with BOMARC?

Mr. HORNER. The first squadron is scheduled to become fully operational in the near future.

Mr. FLOOD. ———

Now, BOMARC itself—after $1.5 billion or $2 billion, and we have nothing up until the first squadron that is supposed to be operational in ——— 1959, and this is April—is nothing but a piece of hardware without the SAGE system; is that not so? That is what the Secretary of Defense told me. I asked him. I asked him: Why do you not take this BOMARC and make it point to point? He was leaving for Tokyo. He said, "I will call you when I come back." So he told me when he came back. He said, "I have the answer."

I said, "That is good for a change, what is it?"

He said, "It is part integrated. It is integrated with the SAGE system. We cannot separate them."

Is that true?

OPERATION OF BOMARC WITH SAGE

Mr. HORNER. The BOMARC is being deployed in the United States for operation within the semiautomatic environment system.

Mr. FLOOD. I ask you a question I want you to answer the question in the best legal tradition and no element in the world outside the British common law gives you a better opportunity to answer a question. I asked you a specific question. Will you answer the question yes or no and then talk all day? It is this: Is BOMARC integrated in its operation with the SAGE system? That can be answered "Yes" or "No," and then you can explain technically if you wish to minimize the answer.

Mr. HORNER. I am not sure what question I am answering.

Mr. FLOOD. I come in and I say, Mr. Secretary, is not the BOMARC missile integrated operationally with the SAGE system?

Mr. HORNER. And the answer is "Yes."

Mr. FLOOD. Do you want to say anything more about it?

Mr. HORNER. Not at this time.

Mr. FLOOD. All right. So, without the SAGE system this $1.5 billion or $2 billion pigeon is just a piece of loose hardware flying around in the air and no good for its real purpose, is that not so? Without SAGE it is a dead pigeon.

Mr. HORNER. The answer is no.

Mr. FLOOD. You mean that it is not without SAGE?

Mr. HORNER. Yes. The BOMARC can be deployed with its own guidance system if you wish to do so.

Mr. FLOOD. That is a fair answer, "if you wish to do so." The only thing wrong with your answer is that the Air Force has no intention of doing so. Is that not so?

Mr. HORNER. That has not been completely determined as yet.

Mr. FLOOD. That is evasive. That, in my opinion, is not an honest answer.

Mr. MAHON. Go ahead and elaborate on that and give us the fullest picture you can, Mr. Secretary.

Mr. HORNER. The main advantage of a sustained propulsion surface-to-air missile is the range that can be attained with it. The range in a point defense, boost-flown system is generally limited by the range of the radar involved. In order to use remote radars, in order to take advantage of the range of the missile itself, it is necessary to have network data and a computer capability. That is the SAGE system.

Mr. FLOOD. That is right.

Mr. HORNER. Now, there is a problem in the deployment of the BOMARC, and all of our air defense weapons using the SAGE system, and that is, if one of the SAGE centers breaks down for any reason, by enemy attack or interruption of communications, then the control of those particular weapons in that sector must be transferred to the adjacent sector. This in air defense terminology is known as Mode 2 operation.

Mr. FLOOD. I know that.

Mr. HORNER. Should two of these adjacent subsectors break down and you still want to insure against that capability, it is necessary to create a redundancy in some other manner. One method of creating such redundancy is to give the BOMARC an integral guidance capability. This integral guidance capability has been developed and used. It has been fired at Patrick. In fact, that is the place where the test program was largely run. We have not made a final decision at this time as to whether at some future date we will apply this integral capability within the BOMARC, or rely completely on hardening enough of the control centers so that they cannot be knocked out easily by enemy action.

Mr. FORD. In that overall air defense command setup, which includes BOMARC, or will include BOMARC when it is operational, NIKE–AJAX and NIKE–HERCULES, is it envisioned they will all be tied in by the SAGE system?

Mr. HORNER. They all use the data acquisition system provided by SAGE; yes, sir.

Mr. FLOOD. Now you and I, so far, for $2 billion, have been talking about an operational bird which ain't yet operational in family A. Actually, you are talking about BOMARC B in the back of your head, are you not?

Mr. HORNER. No, sir.

BOMARC B

Mr. FLOOD. Did you ever hear of BOMARC B?

Mr. HORNER. Yes.

Mr. FLOOD. What is BOMARC B?

Mr. HORNER. BOMARC B is an improvement on the present missile, providing it substantially with a solid propellant booster instead of the liquid fuel, and an advanced selector which gives it an improved, low altitude capability.

Mr. FLOOD. And I was advised that that being the case, that that is an integral part of the SAGE system, the B family, and is so intended to be and will be. Do you know that?

Mr. HORNER. As is the A?

Mr. FLOOD. As is the A. So, if there is any other system with integral guidance, then it is not an inherent part of the SAGE system, and ipso facto it can be point to point and should be with the Army. The Secretary of Defense told me. He called me himself, it was his nickel, and he said that is the reason. Otherwise I think you are right.

Mr. HORNER. I do not understand the reference to point defense.

Mr. FLOOD. Do you know what point defense is? Mr. Ford asked you about NIKE-HERCULES. NIKE-HERCULES is operational, is with the troops, and is in production; is that not so?

Mr. HORNER. It is in production.

VALUE OF BOMARC

Mr. FLOOD. Point to point, with troops on location, operational.

Now, BOMARC at $2 billion, with all these new gimmicks which you are not sure about, and do not know when you will get them, if you ever do, or do not know what you will do with them if you do, is integrated with the SAGE system, is not operational and is not set at point to point. All of those things I am not making up. I am reciting information given to me by the Air Force.

Mr. HORNER. Yes, and they are all very much to the advantage of the BOMARC system.

Mr. FLOOD. How? What is the advantage of the BOMARC system?

Mr. HORNER. The capability to use network data. That is the only way that you can get the range necessary.

Mr. FLOOD. What I am trying to find out is, here is a bird, BOMARC, which after an expenditure of $2 billion, is being evaluated by the Secretary of Defense. Now, that being the case, there is some doubt rattling about this bird BOMARC after an expenditure of $2 billion. The only reason the Air Force wants it is that they do not want the Army to have it. The best Air Force thinking is they would just as soon get rid of it, though there is good tactical theory how it must be mixed with the classical defense against missiles, or against enemy aircraft. The theory is sound, but it is not so hot to them.

What about this: What good is BOMARC against low-flying aircraft coming in at 200 feet to take out your SAGE units? BOMARC is useless, is it not?

Mr. HORNER. No, sir.

Mr. FLOOD. Why not, unless it has a double function? You do not have the inherent control in it yet, and you are going to be operational in ——— and you do not know when you are going to have the built-in system, so as of today, as of ——— the answer is "Yes"; is it not?

Mr. HORNER. Well, at the current time, BOMARC is not deployed operationally.

LOW ALTITUDE CAPABILITY

Mr. FLOOD. It will be in ———. So at such time in your operation after ———, it is dependent upon integration with SAGE and low-flying aircraft knocking out the SAGE system could definitely ground your pigeon.

Mr. HORNER. I evidently have left some confusion.

Mr. FLOOD. You have not left any with me. You may have confused yourself. What have I asked you?

Mr. HORNER. I thought that your question indicated that there was a misunderstanding. The creation of the low-altitude capability in the BOMARC is related to the development of BOMARC B, which is scheduled at this time for deployment. This is what they give the BOMARC for its low-altitude capability. The low-altitude capability of the BOMARC is not related in any way to its having an integral guidance system from the point of launch.

OPERATIONAL DATE OF BOMARC B

Mr. FLOOD. Well, then you are going to utilize the BOMARC system with the SAGE system and without the SAGE system with BOMARC B in ———. What happened to BOMARC A? I just lost that in 10 minutes.

Mr. HORNER. I am sorry. I do not think that I said we were going to have the BOMARC B in ———.

Mr. FLOOD. Yes, you did just about 30 seconds ago.

Mr. MAHON. I do not think so.

Mr. FLOOD. If I am wrong, strike it out. What did you say about BOMARC B?

Mr. HORNER. BOMARC B is scheduled for deployment at a later time than this year. It will have a low-altitude capability. The question of low-altitude capability in the BOMARC B missile is not in any way related to the possibility of the missile having an integral from-point-of-launch, guidance capability. I think that I mentioned earlier we had not made any decision at this time. I, myself, feel it is quite unlikely we will do so. But we have not at this time made any decision to give the BOMARC any integral, from-point-of-launch, guidance capability.

Mr. FLOOD. The answer is close. No, you are not going to. So that leaves me with BOMARC A tied to the SAGE system. I have $2 billion on the bird, and I do not know how many billions on SAGE, so to operate BOMARC A, integrated with SAGE, I have BOMARC

at $2 billion plus whatever fantastic figure we have for SAGE, or whatever part of that fantastic figure you can evaluate in a cost analysis against BOMARC, because SAGE is used for other things than BOMARC, in fairness to BOMARC.

Your cost accountants can do that. In other words, I am indicating that BOMARC is a pretty expensive pigeon which we do not have yet. At least I say that.

RANGE OF BOMARC

All right. That brings this to mind. In reply to Mr. Ford you brought in the radar. Last week in the Washington Post I nearly fell out of the chair when I saw a great big advertisement which said, or left the inference, except to the people in this room, that BOMARC was operational at 400 miles. It was quite a story. Now, if the limit of your radar is about 400 miles, what kind of a radar is BOMARC going to use at 400 miles, or is it going to be operational at 400 miles, BOMARC A, and if it is not, when is BOMARC going to be operational at 400 miles and how many squadrons?

Mr. HORNER. A 400-mile range with reference to BOMARC is related to the BOMARC B missile and it is not limited by the range of the radar.

Mr. FLOOD. Right. So that BOMARC which will be perhaps operational in ——— and integrated with SAGE does not have a range of 400 miles at all; does it?

Mr. HORNER. Approximately 200 miles.

Mr. FLOOD. Sure, which is not 400.

Mr. HORNER. Half of 400.

Mr. FLOOD. But not 400. All right, I am going to telephone these questions to the Army and see what kind of a story they have. I am going to ask them to tell me what they think. Are we going to evaluate NIKE-ZEUS for the Army here predicated upon the value and importance of an opinion like yours and General Wilson's? We want to know.

Now, I think it is equally important to have the Army opinion about your bird.

Mr. MAHON. We can pursue that.

Mr. FLOOD. Whenever we get around to it.

EVALUATION OF BOMARC B

Mr. HORNER. A technical evaluation, Mr. Flood, has been completed.

Mr. FLOOD. That leaves me cold, utterly and completely.

Mr. HORNER. An evaluation made by the Furnas committee.

Mr. FORD. What is the result of that evaluation?

Mr. HORNER. The final report has not been written. They have had only draft reports circulated up until this time. A very general description of the report is an endorsement of the configuration and use of the BOMARC missile in its surface-to-air role.

Mr. FORD. Can you put into the record the names of the people on the Furnas committee?

Mr. HORNER. I will supply that.

(The information requested follows:)

FURNAS COMMITTEE

The following members comprised the ad hoc group on evaluation of the BOMARC IM-99B:

(*a*) Dr. C. C. Furnas, Chairman.
(*b*) Dr. William E. Bradley.
(*c*) Dr. Lawrence R. Hafstad.
(*d*) Dr. Albert G. Hill.
(*e*) Dr. Frederick L. Hovde.
(*f*) Dr. Allen Puckett.
(*g*) Dr. H. R. Skifter.
(*h*) Mr. Carl A. Covington, executive secretary.

Mr. FORD. And the name of the manufacturer of BOMARC.

Mr. HORNER. It is the Boeing Aircraft Co.

DISTINCTION BETWEEN BASIC AND APPLIED RESEARCH

Mr. FLOOD. Will you give us some kind of figure with regard to basic and applied research? I like the use of your term "applied research" in your statement as distinguished from "basic research." It is an important and interesting distinction which has never been quite clear. Perhaps you could develop it a little bit more for our information, that interesting and important distinction, in dollars—if you can approximate a figure—between basic and applied research in your research and development. I think that has great value.

General WILSON. All right. Basic research is the search for new knowledge, fundamental knowledge, and involves such areas as mathematics and all of the scientific disciplines. It is really realtively inexpensive as compared to applied research. In this area we are buying principally intellectual power which is cheap as compared to hardware.

Mr. FLOOD. A nice phrase. You make phrases very well.

General WILSON. It so happens to be.

At the present time our division is about one-fifth of the money being applied to basic research as is being applied to applied research. In the latter we make an effort to reduce the pure scientific information to some practical use. This involves equipments, or materials, or devices that can be tested to demonstrate the new techniques evolved from the basic information, or to prove out feasibility, because we are dealing with hardware in this area. It is relatively costly as compared with the purely intellectual approach.

BOMARC PROGRAM

Mr. MAHON. Mr. Horner, do you have any further comment to any of the questions that have been asked you?

Mr. HORNER. The discussion of the BOMARC program in the context of the overall air defense structure was also mentioned yesterday in response to a question concerning our expenditures for defense against manned aircraft, or an airborne threat.

The BOMARC development is one of quite long standing in the Air Force. It was in response to the Air Force's concept of area defense and defense against the manned bomber as far from our shores as possible. It was in connection with this concept that the range capabilities of the surface-to-air missile were exploited and the BOMARC actually amounts to an effort to carry out, with an un-

manned system, the capabilities in range provided by a manned system and still retain the advantages of performance of a missile. This is a rather difficult program to carry out, as you can see, and it is expensive in dollars and cents at times and it is for this reason we are only now, in the next few months, looking forward to the employing of first missiles.

We have already started testing the B version of the missile which is, for all practical purposes, similar to the A missile. It exploits the advantages of solid propellants over liquid propellants and provides a cheaper and more reliable booster, and also gives us the lower altitude capability.

Our most recent technical review has been extremely thorough, comprehensive in scope, and leads us to the conclusion that we can do no better at this time than to complete the BOMARC and deploy it as a peripheral weapon to defend against the air-supported Russian threat.

Mr. ANDREWS. Mr. Secretary, what is the range of a BOMARC?

Mr. HORNER. The BOMARC A missile has a range of about 200 miles. I say "approximately" because this range varies somewhat with the amount of maneuvering you go through during the boost.

Mr. ANDREWS. Do you know what the range of NIKE–HERCULES is?

Mr. HORNER. The normal range of a NIKE–HERCULES is over 75 miles.

Mr. ANDREWS. What about the AJAX?

Mr. HORNER. Twenty-five miles.

FUNDING OF BMEWS

Mr. FORD. How much do we have in this program for the fiscal year 1960 for BMEWS? I know that there is some money in the 1960 budget for the procurement portion. How much do you have in here?

Colonel STEWART. We do not include any for BMEWS.

Mr. HORNER. Not in the research and development program for BMEWS. It is completely financed from——

Mr. FORD. Would anyone have the total for BMEWS?

General FRIEDMAN. Do you mean for 1960 in the procurement program?

Mr. FORD. Yes.

General FRIEDMAN. Off the record.

(Discussion off the record.)

Mr. FORD. Now, at any cost, it is substantial.

Mr. HORNER. The total cost, to completion, of the BMEWS system in capital investment is presently pegged at $828 million.

Mr. FORD. For the completion of the current system?

Mr. HORNER. Yes. There is always a possibility of wanting to improve the system later.

Mr. MAHON. That is for the three systems?

Mr. HORNER. The three stations.

ADVANCED CONCEPTS OF ICBM DETECTION

Mr. MAHON. Yesterday when Mr. Johnson of ARPA was here he gave a very dramatic presentation of some of the things that they are

planning to do in missile detection, aside from radar utilization. It gave me the impression that in the long run that would be more reliable, or rapid in its results from our point of view in giving us information as to launch and position than radar. If that is going to be a productive area why are we moving into the BMEWS area and not accelerating the projects that Mr. Johnson described?

Mr. HORNER. If I am properly interpreting your remarks, there are several parts to your question. The reason for not accelerating those kinds of projects is that at this time they are to a great extent limited in progress by technology. We have just a great deal to learn yet and a great deal of experience to gain in the military satellite system. We do not, under any circumstances, see how we could deploy a military missile warning system through the use of a satellite in the same time period that we can through the use of the large radars. It is generally considered that, the years 1961, 1962, and 1963, from our current vantage point, are quite dangerous in terms of relative military capability—the U.S.S.R. vis-a-vis the United States, so we have strong motivation for wanting a missile warning system in these years, and the implementation of the BMEWS is the only way we can see that we can get this capability.

Mr. FORD. I have the impression that these systems that Mr. Johnson and his people were talking about were going to be operative or operational at almost the same time that the BMEWS system would be operational. If I have the wrong impression I would like to be corrected because it seems to me if what they implied was true we are spending an awful lot of money on BMEWS that will not be as effective as these other systems.

Mr. HORNER. I think that you have the wrong impression. It happens that the Air Force is carrying out each of these projects under the direction of ARPA, so we are generally quite familiar with the progress that has been made in our proposed programs. I am sure that it would be highly questionable to schedule the availability of a missile warning system in the 1961, 1962, 1963, time period through the use of a satellite today.

Mr. FORD. When would you expect to have your first BMEWS installation in operation?

Mr. HORNER. Off the record.

(Discussion off the record.)

Mr. FLOOD. The only thing wrong with the Secretary's reply to you is that you very carefully asked Mr. Johnson that question yesterday. You pointed out to him and cautioned him to be sure of his answer, and he answered you in the diametric opposite from the witness in the chair.

Mr. FORD. Off the record.

(Discussion off the record.)

FUTURE ICBM DEVELOPMENT

Mr. FORD. We have seen now the program for the ICBM's. We have ATLAS, TITAN, and the MINUTEMAN.

Am I getting the correct impression that in the ICBM area we have reached the end of the line, and for a new weapon system we go into something else, a more advanced, sophisticated, powerful weapon system?

Mr. HORNER. We have studies that are currently active for the possibility of an additional ICBM to exploit better boost systems, possibly better guidance systems, to be able to deliver a larger payload more accurately as a possible counter to hardened military installations in Russia.

I emphasize that these are now in the study stage and we have no decision as to possible implementation.

The MINUTEMAN is, at the present time, our latest active development program.

I think it is premature to say we will never have another ICBM development. It is also premature to say we will have.

Mr. FLOOD. Mr. Ford's question was what will you have after ICBM. You are just talking about a sophisticated next generation.

Mr. FORD. No. What I was interested in was whether or not ICBM's have come to the end of the line so far as a weapon for the future is concerned.

I gather the impression you have not made up your mind one way or another yet.

Mr. HORNER. That is right.

Mr. ANDREWS. I asked Mr. Johnson that question yesterday and he said at least 15 years.

Mr. FORD. I never heard anything specifically about a particular ICBM beyond the MINUTEMAN.

FAILURE IN ATLAS TESTS

You had a failure in the ATLAS a day or so ago, at least the papers implied that. The newspaper also stated this was the third such alleged failure in recent weeks.

Is that true, untrue, and if so what is your observation on it?

Mr. HORNER. I think it is the third launching in a row at Cape Canaveral, in the ATLAS development program, which completed something less than all of its test objectives. They had varying degrees of success in terms of propulsion, guidance, and so on.

In that context it is the third failure in a row.

I do not have a final report on exactly what happened with the last one. We had propulsion failure, and it required that the range safety officer destroy the missile.

Mr. FORD. You have had an opportunity to evaluate the two previous alleged failures. Could you give us the benefit of your views on them, and whether or not they will cause any impediment in the ATLAS schedule for operational use?

Mr. HORNER. They were both random failures.

If it is satisfactory to you I would like to provide the detail of these incidents in the record.

Mr. FORD. That is one of the problems we may have, whether the present program is right or whether it should be implemented. Certainly a series of failures at this late date would have some effect, I believe, on whether we should expand or maintain the present program in the budget.

(Discussion held off the record.)

Mr. HORNER. The most productive thing I can say about the last three failures in the test program of the ATLAS is that they have been random failures. They have each been different from the other. They have not indicated any fundamental design deficiency in the

missile but they do point up the reliability problem in ballistic missiles.

Mr. FORD. That is what I was going to get to. Both General Schriever and General Irvine, when they were here, and more particularly the former, said that progress to date had increased the proposed reliability.

I would gather from this series of partial failures that reliability is not getting better but getting worse.

Mr. HORNER. Our assessment of reliability at this stage is based on a relatively limited number of firings. We can only have an accurate assessment after we have a great number of firings and you reach a statistical average.

Mr. FORD. But your batting average has to go up substantially in the next firings to help you out of that hole.

Mr. HORNER. Yes, sir; that is right. We did have what I consider to be a rather remarkable series of successes which raised our batting average, and perhaps overexpanded it.

Mr. FORD. I think we should have a detailed analysis of what has happened in these recent firings and whether or not it is a serious problem in the ATLAS program.

(The information requested is classified and has been furnished for the committee's use.)

FIRING OF THOR BY BRITISH CREW

Mr. FORD. I heard on the radio this morning, a report that some British newspaper people who had been waiting anxiously out at Vandenberg Air Force Base for a firing of a THOR missile by trained British troops for a week, began to write some stories or ask some questions about why, (1) the weather at Vandenberg should be such a serious problem in the launching of an operational THOR; and, (2) why technical difficulties should now have impeded this shot for a period of several days.

Mr. HORNER. As you know, we are training Royal Air Force crews at Vandenberg, which is the operational training site, to take over operation of the squadrons that are deployed in the United Kingdom.

This particular group of Royal Air Force personnel have been there for some time. They have gone through the ground course of static firing, and they are now engaged in a countdown and launch sequence for actual practice, operationally launching the THOR missile.

It is true that the THOR missile is an all-weather weapon and it does not have to worry about clouds.

However, at this stage of the operation we feel it is quite essential to have instrumentation back from these flights to find out if anything does go wrong what goes wrong and to give us a better break in getting the most out of each flight.

Not being under any terribly significant deadline of getting these training missiles launched we do delay launching when there is cloud cover so we can get visual observation and the best return from the flight.

As in every new crew in training, be it aircraft or missiles, trainees possibly are a little shaky: the weapon is also on the new side, and we do run into technical difficulties that are a combination of the interaction of the trainee operators and the new equipment.

Mr. FLOOD. And the British Labor Party press.

Mr. HORNER. No comment.

Mr. FORD. The British cannot be blamed for the weather. By inference, is somebody trying to blame their crew for this delay?

Mr. HORNER. No, sir. We take full responsibility for the quality of their crew.

Mr. FLOOD. With the weather in the British Isles compared to the weather at Vandenberg, no wonder they are worried.

Mr. MAHON. The point seems to be you can get better instrumentation in good weather so you prefer the better weather in order to get better instrumentation and in order to learn more when you make the firing.

Mr. HORNER. For the training operation. This certainly would not be a constraint under operational conditions.

Mr. FORD. As far as the THOR is concerned, it is on schedule, it has met all of its tests other than this incident out there?

Mr. HORNER. That is correct.

THOR GUIDANCE SYSTEM

Mr. FORD. I keep hearing rumors, however, that there is a problem in the guidance system.

I asked General Irvine or General Schriever whether it was anticipated that you would get a new guidance system for the THOR, and, as I recall, both said categorically that no change had been made.

They were so specific that I got to thinking about the problem. I wonder if they were absolutely right that no change had been made in the guidance system as of the date they testified but was there a very active program going on as to the possibility of changing the guidance system.

Mr. HORNER. There is no program to change the guidance system in the THOR.

I would point out that a guidance system, an inertial guidance system, in one of these missiles is made up of thousands of parts, accelerometers, bearings, control systems, and we are doing continuous research and development.

I would not say at this time that if we get an improved gyro we will not insert it into that guidance system to improve reliability or improve accuracy of the guidance system.

These are the kinds of improvements we make in all of our materiel, but we do not have any program nor do we see any necessity for a program to change the guidance system in the THOR.

When it has performed, it has performed adequately.

As in every other part of the missile, there is a reliability problem in the guidance system.

It is part of the overall missile reliability problem, however.

RESEARCH AND DEVELOPMENT FUNDS FOR ATLAS AND TITAN

Mr. WEAVER. In Vu-Graph 8, General Wilson, you show the breakdown for R. & D., ATLAS–TITAN, $18.5 million. I was curious to know why you group the two together and what the amounts would be separately for those items.

General FRIEDMAN. The break would be $12 million for the ATLAS and for the TITAN, $6.5 million.

Mr. WEAVER. Was any significance attached to grouping them together?

General FRIEDMAN. No particular reason.

ADVANCED PENETRATION AIDS

Mr. WEAVER. Then under "Other," showing $5.8 million, you state on page 8:

The area entitled "Other" includes effort on more advanced penetration aids and planning studies of strategic systems.

General WILSON. Yes, sir.

Mr. WEAVER. Could you elaborate more on that?

General WILSON. This is the usual continuing effort to improve the capability of the bomber. It is simply a study in all of the areas which might pertain to this problem.

There are some specific items.

Colonel STEWART. Less than $1 million is for pure study of advanced strategic systems. The bulk of the money is toward some advanced penetration aid.

Mr. WEAVER. What do you mean by that?

Colonel STEWART. It could be a decoy, a combination of a decoy and radar buster, something beyond what we are talking about in HOUND DOG, ballistic air-to-surface missile, a very advanced penetration aid.

(Discussion off the record.)

Colonel STEWART. To date, sir, we have done only study in this area. Perhaps with this money we can do little bits and pieces in hardware, and not a whole weapon system.

FISCAL YEAR 1960 BOMARC PROGRAM

Mr. MINSHALL. We had discussed at some length, in the previous testimony, the BOMARC situation. To date I believe it was agreed finally that we had spent approximately $1.8 billion on our BOMARC program, R. & D., production, and everything else.

How much is in the fiscal 1960 program for BOMARC?

General FRIEDMAN. About ——— million.

(Discussion held off the record.)

General FRIEDMAN. It is ——— million; including construction, research and development, and procurement.

Mr. MINSHALL. In other words, that will bring up the total investment to $2.5 billion in the BOMARC program?

General FRIEDMAN. $1.8 plus the ——— million. That would be right, sir.

Mr. MINSHALL. The first squadron will not be operational until later this year?

Mr. FLOOD. Plus SAGE.

Mr. MINSHALL. Plus SAGE, that is right.

Do you have any idea of how this compares with the Army's NIKE program, AJAX and HERCULES as to total dollars spent?

General FRIEDMAN. I do not have the figure. I have seen Army projections.

Mr. MINSHALL. Off the top of your hat.

General FRIEDMAN. Sir, I see so many figures—I am not trying to evade the issue—I would not even want to make a guess. I do have

an Army report which takes us through 1965, if I am not mistaken. I could furnish that information for the record.

Mr. MINSHALL. I just wanted figures to compare it favorably with the figures we have talked about here today, the total amount spent to the end of this fiscal year and the figure that will be spent through the fiscal year 1960.

General FRIEDMAN. I do have those figures, and since they were furnished by the Army I am sure——

Mr. MINSHALL. You can supply them for the record if you will or the Army can.

General MOORE. We will get them from the Army and insert them in the record at this point.

(The information requested is classified and has been furnished for the committee's use.)

NEED FOR BOTH NIKE-HERCULES AND BOMARC

Mr. MINSHALL. I just wondered about this: As a new member of this committee, I hesitate to say it, but it seems to me that we have so much unnecessary overlapping and duplication among the various services on various weapons, missiles, types of aircraft, defensive weapons, offensive weapons, and so forth.

It also seems to me that as between the BOMARC and the NIKE, perhaps this has been fought out in other battlefields before, but it still seems that you have a definite overlapping and duplication. The only advantage of the BOMARC is that it has a longer range than the NIKE, but by the same token it is not yet operational.

Would you care to comment on that, Mr. Secretary?

Mr. HORNER. Of course, this very point has been studied in great detail. Aside from the technical features which General Wilson and I are most qualified to respond to, the deployment which is planned on both the NIKE-HERCULES and the BOMARC is such as to eliminate any such duplication.

I believe it is planned to deploy the NIKE-HERCULES primarily, from this point on, around the bases of the Strategic Air Command.

These, to a large degree, are located in central and southern United States.

The BOMARC, on the other hand, is deployed as a peripheral weapon to take advantage of its longer range in striking the attacking enemy before he reaches our borders, and therefore, together, they amount to two elements of defense in depth.

Any attacking bomber has to penetrate, first, hopefully the long-range interceptor defense—the long-range manned interceptor—then the long-range unmanned interceptor—the BOMARC—and next the defense point erected around targets by the NIKE family.

Mr. MINSHALL. Do you not think that even with this strength and depth of our defensive, whether it be the line backers, the secondary, or the safety man, that we still will end up with a tremendous amount of over-kill which has been referred to with the consequent amount of extra expense involved?

Mr. HORNER. Mr. Minshall, I would be hopeful, if we are subjected to an all-out war, and an attack by a determined aggressor, that we could indeed keep their offensive weapons from reaching the targets.

No defense in the past ever has been 100 percent successful, let alone overmanned for that purpose.

Mr. WEAVER. Would the BOMARC be on a continuous alert once it becomes operational?

Mr. HORNER. It will be.

Mr. FLOOD. How much money has been spent for NIKE-ZEUS vis-a-vis BOMARC?

Mr. HORNER. I do not have that figure.

Mr. FLOOD. It would be interesting to look at that for the same purpose. You dismiss ZEUS as being too costly for any purpose, as desirable as its object is.

Mr. MINSHALL. Off the record.

(Discussion held off the record.)

Mr. FLOOD. You might also have the record show what potential, if any, does BOMARC have in any of its classes as an anti-missile-missile.

Mr. HORNER. None.

General WILSON. If I may add a comment to your question, Mr. Minshall? I believe the basic difference you find in the NIKE concept and the BOMARC concept springs from this genesis: One appears to be the descendant of the antiaircraft artillery piece. The other appears to be the descendant of the interceptor.

One is an area defense weapon deployed around the periphery. The other is a point defense weapon deployed internally.

Since they are both to be under the command of NORAD, they would appear to supplement each other rather than to compete.

Mr. MINSHALL. Is it your opinion that NIKE-HERCULES could not do the same kind of a job as BOMARC could?

General WILSON. That is my opinion, sir. BOMARC is an unmanned interceptor. It has the ability to be directed to the target. The last portion of its flight is with a target seeker.

In fact, it acts as an interceptor and would be used beyond the boundaries of the country.

BOMARC AND MANNED INTERCEPTORS COMPARED

Mr. MINSHALL. What advantage does it have, then, over the manned interceptor? How about the 101's, and so on, coming up the line?

General WILSON. The advent of the BOMARC will be reflected in a decreased requirement for manned interceptors numberswise.

Mr. FLOOD. It has been the tradition of the Defense Establishment that all nonmanned interceptors ground to air are ack-ack and point defense until the Air Force presented its exciting case on BOMARC.

I will tell you what happened. The minute the Army came up with AJAX and HERCULES, right away the Air Force wanted BOMARC.

The moment Army came up with HAWK, right away the Air Force wants BOMARC B. They are hanging on to BOMARC with everything they have got. Their best boys don't want the pigeon. They would be tickled to death if the Army took it, but not a chance.

Mr. MINSHALL. I wonder if you would describe to us the interception time differential between BOMARC and a manned aircraft to a target?

General WILSON. It depends on what manned aircraft we are speaking of. If you compare it with the present ones——

Mr. MINSHALL. The time BOMARC will be operational.

General WILSON. It should be considerably quicker with the BOMARC. It stands in a position of readiness and it is a high speed vehicle.

If we are thinking of aircraft to come later on, we have another problem.

Mr. WEAVER. Will there be conflict with the manned interceptor?

General WILSON. There could not. This is one of the principal purposes for SAGE. It is an opportunity to sort projects and——

Mr. MINSHALL. Would you be in favor of deleting it from this next fiscal year, deleting the budget items for manned interceptors?

General WILSON. No, sir. We have not developed the one system fully enough.

Mr. MINSHALL. When that system is developed fully do you believe it could be lessened and we could do away with further manned interceptors?

General WILSON. For local continental defense you will see that the estimates will have a decline in manned interceptors.

Mr. MINSHALL. You say declined. In what calendar year do you think that will be?

Mr. HORNER. There are some characteristics of manned interceptors that cannot be duplicated.

Mr. MINSHALL. You cannot have your cake and eat it, too. He says BOMARC is better.

Mr. FLOOD. You cannot scratch the 108.

General WILSON. Perhaps I oversimplified this.

There are certain situations in which perhaps the BOMARC can do the whole job, but there are others, such as in Europe, where it cannot.

There are other situations in which you have to make a personal——

Mr. MINSHALL. Why can it not do the job in Europe?

General WILSON. It is not deployed in this area yet.

Mr. MINSHALL. If you did have plans for it in Europe it is not a question of whether it can or cannot do it. It is a question you have no intention of doing it. Is that it? The weapon has the capability.

General WILSON. I do not pretend to foresee that far.

Mr. MINSHALL. The weapon does have the capability of defending Europe rather than a manned interceptor?

General WILSON. That is correct.

Mr. MINSHALL. On paper theoretically you can do away with all your manned aircraft.

General WILSON. Unless you had other requirements.

If you have a fixed situation in Europe, conceivably BOMARC can do the job, but if you have to suddenly go down to some other part of the world to put up a defense situation——

Mr. MINSHALL. At the same time we might have to shut down the Air Force Academy you just built.

Mr. FLOOD. You do not mean that, General. You are scratching the 108 against the Russian chemical bombers.

General WILSON. I am not speaking of the F–108.

Mr. FLOOD. I am.

General WILSON. If you are I should say definitely "No." We must develop the F–108.

Mr. FLOOD. Then don't tell this man a BOMARC will take the place of European ground-based interceptors.

Mr. MINSHALL. Explain it. I refered to interceptors we would have in December.

Mr. FLOOD. You have money for the F–108 in this budget.

General WILSON. This is another type of beast. It is a very long-range fighter. This would work beyond the periphery of the BOMARC to extend the battle closer to the enemy and farther from our shores. This is another type of aircraft.

Mr. MINSHALL. When will that be in the inventory?

Mr. HORNER. Off the record.

One characteristic has not been discussed. One of the very important needs for a manned interceptor is to make a positive identification.

When the war is actually fought the surface to air missile will be very effective and will bear the brunt of the attack, but we always face the problem of surprise and we cannot start shooting surface-to-air missiles until we have definitely identified an attack, and this can be done only by a manned interceptor.

Mr. MINSHALL. That is what disturbs me. Perhaps I am green and should not say this. You talk about duplication between the services. Here again you have duplication within your own Air Force, between BOMARC and the first class of the Century series aircraft, that will be completely outmoded when you get BOMARC operational.

Mr. FLOOD. That far you are right.

Mr. MAHON. Will you comment on that observation?

Mr. HORNER. The first of the Century series aircraft already have been in service for 5 years. I would be inclined to agree with you that after another 3 to 5 years they probably will approach obsolescence, and we will have to consider replacing them.

As far as the duplication between manned interceptors and surface-to-air missiles, we foresee we will always have to have some of both in order to take advantage of the characteristics of both.

This does not mean we need to have as many manned interceptors, when we have BOMARC deployed, as we currently have. We will reduce the number of manned interceptors when we add BOMARC.

Mr. FORD. Why don't you show the decrease in interceptor, manned aircraft squadrons now and as programed with the buildup of the BOMARC squadron program?

Mr. HORNER. We will be glad to do that.

Mr. FLOOD. Also show where we expect the Russian so-called chemical bomber in 3½ years, and unless we have the F–108 in that time we will have nothing up there.

Mr. HORNER. We will provide the best intelligence information we can.

(The information requested is classified and has been furnished for the committee's use.)

SPEED OF BOMARC

Mr. FORD. What is the speed of the BOMARC missile in and of itself?

General WILSON. On the order of 2½ mach. We would hope it would be slightly better but 2½ is the general order.

REASONS FOR CONTINUING BOMARC

Mr. MAHON. I get the implication here that there might be a feeling in some sources that the BOMARC is being developed because the Air Force would hesitate to cancel an expensive program and thereby write off as a loss such a huge amount of funds.

Is there anything at all to that?

Mr. HORNER. No, sir. There is absolutely no such feeling in the Air Force.

Mr. MAHON. Is there any attempt to bail out Boeing on this at all?

Mr. HORNER. No, sir.

Mr. FLOOD. You did not expect this man to say "Yes" to either of those questions; did you?

Mr. HORNER. I can say again that the most recent technical review we have had of the BOMARC does endorse this as a technical solution for defense against the airborne threat.

Mr. MAHON. Could we cancel out the BOMARC and rely on the Army versions of the HAWK and the NIKE series?

Mr. HORNER. I think the NIKE series performs a useful air defense function. I would point out some of the limitations which the BOMARC is designed to overcome.

Mr. MAHON. You can elaborate on that in the record.

(The information requested is classified and has been furnished for the committee's use.)

ATLAS TEST FAILURES

Mr. THOMSON. On the random failures of ATLAS which were discussed a few minutes ago, referring to the last three attempts, were those associated with improvements that are being built into the missile in the way of the guidance system or is that in the missile as originally constituted?

Mr. HORNER. As we have discussed before, the ATLAS missile, in its development test, was built in four different series. These were the ATLAS, A, B, C, and D.

Succeeding series of missiles became more and more complex toward the operational missile.

Of these last three missiles which we are discussing, two were C missiles and one was the D missile.

The D missile is, to all practical purposes, the operational configuration.

It was in the D missile that we had a propulsion malfunction. This was the most recent occasion.

In the C series of missiles we had more test instrumentation, we had not the complete reentry body stabilization, and there were other differences.

However, it was a test missile.

Mr. THOMSON. I understand you will cover that for the record. It was not improvements which are being planned and built in from the TITAN system which caused the failures?

Mr. HORNER. That is correct. Each of these three missiles were developing toward the operational configuration of the ATLAS itself.

USE OF BERYLLIUM

Mr. THOMSON. General, with reference to the discussion on beryllium and the requirements for it, is procurement turned over to Office of Defense Mobilization?

General WILSON. This is true. We can give you a figure on how much we are getting.

It is being used to some considerable extent already.

Mr. THOMPSON. You foresee a requirement for it in large amounts which are not presently available?

General WILSON. Yes, sir; we do.

ORGANIZATIONS WITH RESEARCH CONTRACTS

Mr. THOMSON. By whom are basic research funds spent? Are they spent by people employed within the Air Force? Is it contracted out? How is that handled?

General WILSON. It is contracted out, sir, to individuals, to institutions of learning, nonprofit organizations.

Mr. THOMSON. None of that money goes to a contractor, merely saying they would like to have research done in that area. It is to scientific institutions with whom you place the funds?

General WILSON. I would like to be quite certain of this.

Mr. HORNER. There are some contracts with industrial research organizations where contracts are let in response to research proposals from the industries involved.

The bulk of the contracts are with nonprofit institutions and universities.

Mr. THOMSON. The reason I inquire with regard to this is that I had occasion to talk for a short time with a man from the Navy who was in research and development.

He expressed concern that there was overlapping of research with these contracting agencies. He thought it was fine, that it should go to different corporations and companies, but he said they were inclined to keep it secret, that one might make a breakthrough and in turn another would be working on a similar problem which was very much part of the other, and there would be a substantial expediture of funds before you pried it out of the first company which solved the problem.

Mr. HORNER. This is one of the difficulties of contracting for basic research with profit-taking industry.

We must, ourselves, spend more attention to the proper dissemination of the information than we do when the contract is with a university or a nonprofit institution who usually feels proud of its work and assists us in disseminating information broadly.

DISSEMINATION OF SCIENTIFIC INFORMATION

Mr. THOMSON. We were talking earlier about the NIKE series and the BOMARC. I suppose there were several common problems involved.

That happens to involve two different services, but do we have a definite program for checking to see that information is made available just as soon as it is developed and that it is disseminated both within the service and between the services?

Mr. HORNER. Yes, sir. This is primarily the responsibility of the Director of Defense Research and Engineering. He usually carries this function out by forming joint committees between the Departments to integrate the information.

Mr. THOMSON. We heard talk about Convair developing the ATLAS, Martin developing the TITAN, and so on down the line, Boeing working on the MINUTEMAN.

Suppose Douglas has a program in which they are interested and a breakthrough is made by any one of these companies.

Is it then, in turn, made available generally or do they have a property right on this information?

Mr. HORNER. This depends on whether or not in making this breakthrough they spent their own industrial and capital funds or whether the work was purchased by the Defense Department.

If it is purchased by the Defense Department there are always provisions in the contract to make the information available.

Mr. THOMSON. That must be a pretty difficult area to define.

Mr. HORNER. It is, indeed.

Mr. FORD. General Wilson, on page 15 of your prepared statement, the fourth line down, you say this:

> The Westinghouse breakthrough, which is proprietary, reduces the number of component parts of an electronic equipment by literally growing solid state materials into functional electronic components.

I was intrigued with the inclusion of the phrase "which is proprietary." What do you mean?

General WILSON. This was a development produced with their own moneys, and they own the process. It is a most remarkable process of literally growing components.

Mr. THOMSON. You say it is proprietary. You mean benefits from that breakthrough are theirs?

General WILSON. Yes, sir.

Mr. THOMSON. We have to buy from them if we want to use these benefits?

General WILSON. That is right.

General DEMLER. We are speaking of a proprietary development of a method of growing pure crystals. They did this in their own laboratories without sponsorship of the Government. That process is theirs.

We hope to take advantage of this in the application to specific items of our hardware, for example, in the infrared detectors. The results of their technology is the application we are interested in applying.

Mr. THOMSON. There is no doubt about the fact it was their breakthrough without any Federal funding.

General DEMLER. That is right. It is possible to make sure I answer the question properly that another company, seeing the application they had, will develop another process of doing the same thing, namely, a rapid growth of pure crystals rather than the slow tedious laboratory type we have been experimenting with to date in an area called solid state physics. This is strictly a long-haired, university laboratory operation.

Westinghouse is one of the first to make this break from a production point of view.

Mr. THOMSON. Is that a patentable process?

General DEMLER. Yes, sir. Their particular method of producing these crystals in a rapid, production-type method is certainly patentable.

Mr. THOMSON. It would seem to me that when we are spending such large sums on research and development, I think large compared to what is being spent generally, that we should have some sort of an arrangement, if possible, whereby we can obtain rights for military application without having to pay further for it.

General DEMLER. The basic research of which you speak has been supported by the Government in previous years where the peculiarities of crystals with certain impurities will do certain electronic functions. No one has a patent on that. It is general knowledge now in the basic research area.

When you get into a specific application of hardware of this type, then under our system this is a patentable process.

If we had sponsored this work, by the way, and paid Westinghouse for their laboratory work, that is something else again, but they chose to do this on their own.

ELIMINATION OF PROGRAMS

Mr. THOMSON. One other question. With the development which has taken place, inquiry has been made about elimination of this or that, and so far there has not been such support for elimination of anything.

Do you know of any areas where, in your opinion, eliminations can be made, where programs can be eliminated which are coming up in the near future?

General WILSON. We are constantly studying this, sir. Our problem really has been that there are so many additional things that we would like to do, that it really is not a question of elimination. We are speaking in the basic research and the applied research area.

Mr. THOMSON. I mean of the existing weapon systems, are you people consulted upon that by the Office of the Secretary of Defense as to what can be eliminated from the current inventory and the current program?

General WILSON. This is constantly under study, sir; yes.

Mr. THOMSON. Thank you.

General WILSON. We have eliminated some, you know, sir. We have eliminated NAVAHO and several others. We eliminated QUAIL this year—GOOSE, not QUAIL.

Mr. FORD. That would be news if you had.

General WILSON. GOOSE, not QUAIL.

(Off the record.)

DEATH RAY

Mr. MAHON. General Wilson, in your statement you referred to research into so-called death rays. In the ARPA presentation we also heard about death-ray research. Is your program a part of the ARPA program? If not, how are the programs coordinated?

General WILSON. The Air Force death-ray program involves research into the possible use of radiation energy as the lethal technique

in an Air Force weapon. This program is not an ARPA program. This Air Force progam was fully coordinated with the ARPA by a formal presentation. Further, the Air Force and ARPA programs have been jointly presented to the Office of the Assistant Secretary of Defense, Research and Engineering to ascertain whether funding through DOD emergency funds should be granted these programs in fiscal year 1959.

ARNOLD ENGINEERING DEVELOPMENT CENTER

Mr. MAHON. Will you compare the fiscal year 1959 expenditures at the Arnold Engineering Development Center with the proposed fiscal year 1960 expenditures?

General WILSON. I will submit those figures for the record.

(The following information was submitted:)

	Fiscal year 1959	Fiscal year 1960
Total AEDC	$27,443,000	$28,488,000
Contract portion of above figure	21,200,000	22,500,000

Mr. MAHON. What major programs are being carried out at this facility?

General WILSON. AEDC's testing facility is playing a key role in investigating many problems in the development of the weapon systems listed below.

The tunnels are, in general, the largest available for producing the combination of high mach numbers, Reynolds numbers, temperatures, and velocities required for valid test data.

(A classified statement showing the current and projected programs was submitted.)

Mr. MAHON. Please submit for the use of the committee a list of the significant developments achieved at this facility last year.

(The material referred to is classified and was submitted for the committee.)

Mr. MAHON. How many personnel are employed at this facility?

General WILSON. There are 117 Government employees and 2,440 contract employees presently employed.

(The following table was submitted:)

	Fiscal year 1958	Fiscal year 1959 [1]	Fiscal year 1960
Government employees	118	117	118
Contract employees	2,196	2,440	2,331

[1] As of Mar. 31, 1959.

RESEARCH CONTRACTS WITH COLLEGES AND UNIVERSITIES

Mr. MAHON. Will you supply the committee with a list of the colleges and universities with which you have research contracts?

General WILSON. We will be glad to supply such a list.

(The information is as follows:)

UNIVERSITIES AND COLLEGES PERFORMING BASIC RESEARCH FOR THE AIR FORCE AS OF MARCH 1, 1959

University of Alabama
Alfred University
Antioch College
Baylor University
Baylor University Medical Center
Boston College
Boston University
Brandeis University
Brown University
Bucknell University
California Institute of Technology
Carnegie Institute of Technology
Case Institute
Catholic University of America
College of Medical Evangelists
Colorado School of Mines
Columbia University
Cornell University
DePaul University
DePauw University
Duke University
Eastern Nazarene College
Florida State University
Fordham University
George Washington University
Georgetown University
Georgia Institute of Technology
Howard University
Indiana University
Iowa State College
Johns Hopkins University
Kent State University
Lehigh University
Leland Stanford University
Los Angeles College
Massachusetts Institute of Technology
McMaster University
Miami University
Michigan State College
New York University
Northwestern University
Ohio State University
Ohio University
Oklahoma A. and M. College
Pennsylvania State College
Polytechnic Institute of Brooklyn
Pomona College
Princeton University
Purdue University
Rensselaer Polytechnic Institute
Rice Institute
Rutgers University
Smith College
Stevens Institute
Syracuse University
Temple University
Texas A. and M.
Trinity College
Tufts University
Tuskegee Institute
University of Arkansas
University of Buffalo
University of California
University of California at Los Angeles
University of Chicago
University of Cincinnati
University of Colorado
University of Dayton
University of Delaware
University of Denver
University of Detroit
University of Florida
University of Hawaii
University of Illinois
University of Kansas
University of Kentucky
University of Maryland
University of Massachusetts
University of Miami
University of Michigan
University of Minnesota
University of Missouri
University of New Hampshire
University of New Mexico
University of North Carolina
University of Notre Dame
University of Oklahoma
University of Oregon
University of Pennsylvania
University of Pittsburgh
University of Rochester
University of St. Louis
University of South Carolina
University of Southern California
University of Texas
University of Toledo
University of Utah
University of Virginia
University of Washington State
University of Wisconsin
Washington State College
Washington University
Wayne University
Western Reserve University
Yale University

Mr. MAHON. Would you discuss briefly the type of contract used and supply copies of this type of contract to the committee?

General WILSON. ARDC uses cost-reimbursement (without fee) contracts with colleges and universities. These cost-reimbursement-type contracts provide for payment to the contractor of allowable costs incurred in the performance of the contract to the extent prescribed in the contract. This type of contract establishes an estimate of total cost for the obligation of funds and establishes a ceiling which

the contractor may not exceed, except at his own risk, without prior approval or subsequent ratification of the contracting officer.

This type contract has been found to be most suitable for use with colleges and universities since the nature and complexity of the research is such that costs of performance cannot be estimated in advance with reasonable accuracy.

(Sample contracts were submitted for the use of the committee.)

Mr. MAHON. What are the regulations with respect to overhead costs for Air Force basic research contracts with universities?

General WILSON. Each cost-reimbursement contract entered into between the Air Research and Development Command and educational institutions provides in general provision No. 3 for reimbursement of overhead costs to the contractor in accordance with the cost principles contained in part 3 of section XV of the Armed Services Procurement Regulation.

Overhead rates allowed by ARDC on cost-reimbursement (without fee) contracts are obtained by applying negotiated overhead rates to bases agreed on by the contractor and contracting officer involved. ASPR, section XV, part 3, outlines the principles and standards used in determining the allowable costs of research and development performed by educational institutions.

Basically, negotiated overhead rates identify that allocable portion of allowable indirect costs educational institutions can rightfully charge to DOD-sponsored research and development contracts which are not readily subject to treatment as direct costs of research contracts. Types of indirect costs allowed are general administration and general expenses, research administrative expenses of an identifiable administrative unit, operation and maintenance expenses incurred for operating and maintaining the institution's physical plant, library expenses, use allowance of equipment, buildings, and capital improvements, and indirect departmental expenses.

To establish the negotiated overhead rates, the contractor maintains records based on generally acceptable cost accounting principles and practices. Government audit of these records is made and a report as to their accuracy and reasonableness is submitted to the contracting officer. Upon receipt of this report, the apportionment and allocation of these confirmed indirect costs are negotiated between the Government and contractor. This negotiated overhead rate provides all DOD agencies with a common basis for determining allowable indirect costs of research under individual contracts.

Mr. MAHON. Who has the responsibility for evaluating the work performed under ARDC basic research contracts?

General WILSON. Air Force contracts with universities for basic research are monitored and evaluated by Air Force scientists at the operating centers of the Air Research and Development Command. The centers contracting for over 95 percent of Air Force basic research with universities are: Air Force Office of Scientific Research, Wright Air Development Center, and Air Force Cambridge Research Center. Scientists at these centers prepare the original work statement contained in the contracts, follow the program of research on each contract through visits and evaluation of reports from contractors, are responsible for coordination with other centers, Government agencies, and other workers in the field, and finally must insure that significant

progress is reported and brought to the attention of Air Force users.

Mr. MAHON. What efforts are made to see that research groups which are unproductive are not given further contracts or extensions of existing contracts?

General WILSON. Since over 50 percent of the university basic research contracts in the Air Force are initiated by the Office of Scientific Research, the following remarks, while pertaining primarily to that organization, are considered indicative of the Air Force research program. The Air Force Office of Scientific Research initiates all contracts on the basis of unsolicited proposals. Therefore, every effort is made to carefully review the proposed research and the capabilities of the scientific investigators to pursue the research program outlined in the proposal. In addition to a competent scientific staff, which in numbers comprises 34.7 percent of the personnel of the organization, provisions are made for independent evaluation by outside consultants. This rigorous review precludes procurement of research where the research staff is incompetent. Furthermore, a continual backlog of excellent research proposals necessitates a continuing review of each contract with a decision as far in advance as practicable of renewal time. We have chosen, therefore, to discuss "diminished productivity" where, in the opinion of the AFOSR task scientist, continuance of the contract is not economical. Factors for consideration are availability of the proper research tools, increasing teaching load, unavailability of programed personnel, etc. This continuing review of individual contracts is not only the responsibility of the task scientist for the specific contract but also of the other management echelons of AFOSR.

(The following additional information was submitted:)

In addition to diminished productivity, we have outlined some five other reasons for nonrenewal of contracts. These are:

(*a*) Transfer to another agency: On occasion a contract may move very rapidly into an area with possible immediate Air Force application or into an area where its funds should more properly come from applied rather than the basic research funding category. In such cases, it is the policy of AFOSR to transfer the contract to another ARDC Center.

(*b*) Principal investigator leaves: In basic research contract, one is buying the services of the principal investigator and his research staff. Since the basic ideas are those of the principal investigator, it is usually not practical to substitute in the event he leaves the university. In such cases, it is usually necessary to discontinue the contract and renew the work at the new university provided the arrangements are mutually acceptable.

(*c*) No renewal proposal: In the event a renewal proposal is not submitted by the principal investigator, the contract is then discontinued.

(*d*) Changing Air Force emphasis: The mission is to buy research of possible application to the Air Force and as the Air Force interests change it is necessary to adapt our research program to these changing priorities. This is part of a continuing program to keep the Air Force research program vital.

(*e*) Completed phase: This means in essence that the work has reached a logical stopping place which may be due to determination that the selected project will not work and that continuance along the present direction is not warranted. On the other hand, it usually means that the study has been satisfactorily completed and a final report of the findings submitted.

Mr. MAHON. What programs have been terminated on this basis in the past year?

General WILSON. It is highly essential that this organization have funds available for novel and ingenious new ideas. Therefore, on a level budget there must be a turnover of research if funds are to be available for new work. We will submit a summary showing the

number of contracts which have been discontinued during the past year, for the reasons explained.

(The information requested follows:)

AFOSR SUMMARY OF CONTRACTS NOT RENEWED, APRIL 1, 1958, TO APRIL 1, 1959

Reason	Total	Percent per reason
1. Diminished productivity	6	3.1
2. Transferred to other agency	15	7.5
3. Principal investment left	21	10.5
4. No renewal proposal	4	2.0
5. Changing Air Force interest	40	20.1
6. Work phase completed	113	56.8
Total nonrenewal [1]	199	100.0
Total active plus nonrenewal	904	

[1] Total nonrenewal equals 22 percent of total active and nonrenewal.

Mr. MAHON. Thank you very much, gentlemen. I am sorry I did not hear all of your testimony, but I am sure it was very helpful. We have been pleased to hear you people during these months of testimony. You have been very helpful to us.

Mr. Horner, we hear that you are leaving the Air Force. I feel that this will be a real loss to the Air Force. You have been very helpful to this committee since you have held your present position and we have been impressed with your grasp of the very complex problems of research and development.

We may want to call on you again before we finally complete our study of the 1960 budget proposals for the Department of Defense. Thank you very much.

MONDAY, APRIL 20, 1959.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, NAVY

WITNESSES

REAR ADM. J. T. HAYWARD, USN, ACNO (RESEARCH AND DEVELOPMENT)
REAR ADM. R. BENNETT, USN, CHIEF OF NAVAL RESEARCH
REAR ADM. K. S. MASTERSON, USN, DIRECTOR, GUIDED MISSILES DIVISION, CNO
BRIG. GEN. GEORGE SHELL, DEPUTY CHIEF OF STAFF, HEADQUARTERS, MARINE CORPS (R. & D.)
WILLIAM W. EDWARDS, COMPTROLLER, ONR
REAR ADM. E. B. GALLOWAY, ASSISTANT CHIEF OF BUREAU OF MEDICINE (R. & D.)
CAPT. E. O. WAGNER, COORDINATOR OF RESEARCH, OFFICE OF CHIEF OF NAVAL OPERATIONS

Program and financing

	1958 actual	1959 estimate	1960 estimate
Program by activities:			
Direct obligations:			
1. Military sciences	$91,167,023	$82,398,921	$89,149,424
2. Aircraft and related equipment	119,079,608	111,445,864	114,640,392
3. Missiles and related equipment	277,263,265	481,517,016	448,385,779
5. Ships and small craft and related equipment	131,732,992	158,354,676	167,515,420
6. Ordnance, combat vehicles, and related equipment	68,786,302	91,117,676	96,091,200
7. Other equipment	40,356,016	56,534,846	52,973,785
Total direct obligations	728,385,206	981,368,999	968,756,000
Reimbursable obligations:			
1. Military sciences	6,060,575	9,205,708	8,527,000
2. Aircraft and related equipment	804,778	799,526	730,000
3. Missiles and related equipment	3,893,048	5,875,755	5,366,000
5. Ships and small craft and related equipment	3,329,792	3,134,529	3,295,000
6. Ordnance, combat vehicles, and related equipment	2,166,677	3,106,490	3,107,000
7. Other equipment	499,325	804,992	800,000
Total reimbursable obligations	16,754,195	22,927,000	21,825,000
Total obligations	745,139,401	1,004,295,999	990,581,000
Financing:			
Comparative transfers from (−) other accounts	−142,482,333	−154,860,999	
Unobligated balance brought forward	−22,725,465	−10,228,978	−14,999,978
Unobligated balance transferred (1960 appropriation act) from—			
"Aircraft and related procurement, Navy"			−3,502,175
"Shipbuilding and conversion, Navy"			−900,000
"Procurement of ordnance and ammunition, Navy"			−5,899,863
"Procurement, Marine Corps"			−1,100,000
Advances and reimbursements from—			
Other accounts	−16,386,663	−22,802,000	−21,700,000
Non-Federal sources (10 U.S.C. 2481)	−367,532	−125,000	−125,000
Unobligated balance carried forward	10,228,978	14,999,978	28,566,016
New obligational authority	573,406,386	831,279,000	970,920,000
New obligational authority:			
Appropriation	527,200,000	821,285,000	970,920,000
Transferred from "Emergency fund, Department of Defense" (70 Stat. 456; 71 Stat. 313)	47,813,800		
Transferred to "Expenses," Airways Moderization Board (31 U.S.C. 581c)	−1,607,414		
Appropriation (adjusted)	573,406,386	821,285,000	970,920,000
Proposed supplemental due to pay increases		9,994,000	

Object classification

	1958 actual	1959 estimate	1960 estimate
RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, NAVY			
Total number of permanent positions	24,014	23,205	23,168
Full-time equivalent of all other positions	12	12	12
Average number of all employees	21,701	21,718	21,734
Number of employees at end of year	21,501	22,017	22,088
Average GS grade and salary	9.0 $6,671	9.2 $7,546	9.2 $7,573
Average salary of ungraded positions	$5,021	$5,250	$5,269
Personal service obligations:			
Permanent positions	$120,914,091	$128,171,256	$128,345,594
Positions other than permanent	99,107	101,900	101,900
Other personal services	3,668,509	3,696,190	4,062,654
Total personal service obligations	124,681,707	131,969,346	132,510,148
Direct obligations:			
01 Personal services	119,544,432	126,799,901	127,339,703
02 Travel	3,144,720	4,076,256	4,106,750
03 Transportation of things	144,097	197,400	198,400
04 Communication services	733,102	798,298	806,100
05 Rents and utility services	3,840,799	4,509,510	4,709,000
06 Printing and reproduction	251,467	313,600	256,600
07 Other contractual services	391,478,793	612,523,490	565,282,110
Services performed by other agencies	3,414,757	3,328,000	3,635,000
08 Supplies and materials	115,873,372	125,586,543	133,646,160
09 Equipment	86,002,511	98,776,031	124,271,840
10 Lands and structures	166,747	174,700	177,000
11 Grants, subsidies, and contributions	7,607,051	8,155,750	8,170,737
15 Taxes and assessments	62,590	56,025	56,600
Subtotal	722,264,438	985,295,504	972,656,000
Deduct portion of foregoing obligations originally charged to object class 07	4,006,920	3,945,000	3,900,000
Total direct obligations	738,257,518	981,350,504	968,756,000
Reimbursable obligations:			
01 Personal services	5,137,275	5,169,445	5,170,445
02 Travel	150,251	164,253	193,000
03 Transportation of things	2,200	2,400	2,600
04 Communication services	38,809	50,500	57,000
05 Rents and utility services	616,304	900,994	906,000
06 Printing and reproduction	22,605	37,000	44,000
07 Other contractual services	7,901,342	12,715,776	11,274,000
08 Supplies and materials	798,870	941,209	1,192,255
09 Equipment	1,756,074	2,623,088	2,663,000
10 Lands and structures	5,500	6,000	6,000
11 Grants, subsidies, and contributions	322,795	314,535	314,900
15 Taxes and assessments	2,170	1,800	1,800
Total reimbursable obligations	16,754,195	22,927,000	21,825,000
Total, Navy	745,011,713	1,004,277,504	990,581,000
ALLOCATION ACCOUNTS			
Total number of permanent positions	1	2	
Full-time equivalent of all other positions	3		
Average number of all employees	4	2	
Number of employees at end of year	0	2	
Average GS grade and salary	12.0 $7,570	7.9 $6,560	
01 Personal services:			
Permanent positions	$7,266	$14,350	
Positions other than permanent	21,110	656	
Other personal services	7	50	
Total personal services	28,383	15,056	
02 Travel	3,228		
07 Other contractual services	93,267	1,469	
08 Supplies and materials	2,008	1,070	
11 Grants, subsidies, and contributions	631	900	
15 Taxes and assessments	171		
Total allocation accounts	127,688	18,495	
Total obligations	745,139,401	1,004,295,999	990,581,000

Object classification—Continued

	1958 actual	1959 estimate	1960 estimate
ALLOCATION ACCOUNTS—continued			
Obligations are distributed as follows:			
Navy	$745,011,713	$1,004,277,504	$990,581,000
Department of the Interior:			
Bureau of Mines	1,561	17,370	
Geological Survey	1,783		
Department of Commerce (National Bureau of Standards)	73,318	469	
Army	56		
Department of Health, Education, and Welfare (Public Health Service)	8,215		
Federal Aviation Agency	36,845		
Library of Congress	5,910	656	

Mr. MAHON. Gentlemen, we will continue to survey as well as we can the military budget for the fiscal year 1960, and take up now the appropriation "Research, development, test, and evaluation, Navy."

JUSTIFICATION OF THE ESTIMATE

Please place in the record at this point the appropriation pages of the justifications.

Summary of comparative new obligational authority

Number	Budget activity	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Difference, increase (+) or decrease (−), fiscal year 1960 compared with fiscal year 1959
1	Military sciences	$89,587,239	$84,548,783	$88,821,549	+$4,272,766
2	Aircraft and related equipment	113,216,074	114,404,090	115,412,992	+1,008,902
3	Missiles and related equipment	273,331,743	480,990,409	451,544,379	−29,446,030
5	Ships and small craft and related equipment	132,748,715	159,544,480	164,758,420	+5,213,940
6	Ordnance, combat vehicles and related equipment	68,536,733	89,709,557	94,227,000	+4,517,443
7	Other equipment	39,145,715	56,905,680	56,155,660	−750,020
	Total comparative new obligational authority	716,566,219	986,102,999	970,920,000	−15,182,999
	Net adjustment for comparative transfers	−143,159,833	−154,823,999		+154,823,999
	Total new obligational authority in budget document	573,406,386	831,279,000	970,920,000	+139,641,000
	Add: Comparative transfer of obligations from other accounts	142,482,333	154,860,999		−154,860,999
	Less: Obligations to be incurred in subsequent years	7,103,018	14,999,978	28,566,016	+13,566,038
	Obligations against current-year funds	708,785,701	971,140,021	942,353,984	−28,786,037
	Add: Obligations against prior-year authority	19,599,505	10,228,978	14,999,978	+4,771,000
	Proposed transfer of obligations against prior-year authority from other accounts			11,402,038	+11,402,038
	Total direct obligations in budget document	728,385,206	981,368,999	968,756,000	−12,612,996

The previous tables show the distribution of this appropriation on the standardized Department of Defense functional category basis. The following tables and the justifications present the appropriation in the manner in which the Navy administers it, i.e., by naval organization. Each of the Navy bureaus and the Marine Corps has been assigned a precise segment of the Navy's total operational

mission and is held responsible for its effective conduct including the conduct of research, development, test, and evaluation projects to satisfy the particular requirements of its functional task.

Summary of comparative new obligational authority—classification for purposes of justification and administration

Number	Budget activity	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Difference, increase (+) or decrease (−), fiscal year 1960 compared with fiscal year 1959
1	Office of Naval Research	$79,206,550	$84,550,000	$88,942,000	+$4,392,000
2	Bureau of Aeronautics	177,502,676	220,330,360	239,737,000	+19,406,640
3	Bureau of Ships	127,542,000	156,459,000	165,890,000	+9,431,000
4	Bureau of Ordnance	309,533,397	499,154,639	451,190,000	−47,964,639
5	Bureau of Medicine and Surgery	4,474,000	4,802,000	4,800,000	−2,000
6	Bureau of Yards and Docks	3,685,499	3,808,000	3,983,000	+175,000
7	Bureau of Supplies and Accounts	947,000	2,264,000	2,180,000	−84,000
8	Bureau of Naval Personnel	672,500	764,000	800,000	+36,000
9	Marine Corps	13,002,597	13,971,000	13,398,000	−573,000
	Total comparative new obligational authority	716,566,219	986,102,999	970,920,000	−15,182,999
	Net adjustments for comparative transfer	−143,159,833	−154,823,999		+154,823,999
	Total new obligational authority in budget document	573,406,386	831,279,000	970,920,000	+139,641,000
	Add comparative transfer of obligations from other accounts	142,482,333	154,860,999		−154,860,999
	Less obligations to be incurred in subsequent years	−7,103,018	−14,999,978	−28,566,016	−13,566,038
	Obligations against current-year funds	708,785,701	971,140,021	942,353,984	−28,786,037
	Add obligations against prior-year authority	19,599,505	10,228,978	14,999,978	+4,771,000
	Proposed transfer of obligations against prior-year authority from other accounts			11,402,038	+11,402,038
	Total direct obligations in budget document	728,385,206	981,368,999	968,756,000	−12,612,999

Budget Activity No. 1—Office of Naval Research—Comparative New Obligational Authority by Budget Project

Number	Budget activity	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Difference, increase (+) or decrease (−), fiscal year 1960 compared with fiscal year 1959
1A	Military sciences	$61,122,968	$55,992,000	$57,420,000	+$1,428,000
1B	Aircraft and related equipment	6,326,310	5,340,000	9,843,000	+4,503,000
1C	Missiles and related equipment	302,618	1,005,000	3,732,000	+2,727,000
1D	Ships and small craft and related equipment	5,188,223	6,405,000	5,393,000	−1,012,000
1E	Ordnance, combat vehicles, and related equipment	104,891	20,000	389,000	+369,000
1F	Other equipment	6,161,540	15,788,000	12,165,000	−3,623,000
	Total comparative new obligational authority	79,206,550	84,550,000	88,942,000	+4,392,000
	Net adjustment for comparative transfers	−490,000	+29,000		−29,000
	Total new obligational authority in budget document	78,716,550	84,579,000	88,942,000	+4,363,000
	Add comparative transfer of obligations from other accounts				
	Less obligations to be incurred in subsequent years	93,271	2,295,729	2,295,729	
	Obligations against current-year funds	78,809,821	82,283,271	86,646,271	+4,363,000
	Add obligations against prior-year authority	1,412,195	−93,271	2,295,729	+2,389,000
	Proposed transfer of obligations against prior-year authority from other accounts				
	Total direct obligations in budget document	80,222,016	82,190,000	88,942,000	+6,752,000

1958	actual	$79,206,550
1959	estimate	84,550,000
1960	estimate	88,942,000

Funds requested under this activity enable the Office of Naval Research to conduct broad supporting research for the Navy as a whole and to provide the link which ties the various functional programs together. The overall operating and warfare problems of the Navy are so diverse and so difficult that it is essential to have a broad Navy-wide research effort to acquire the necessary scientific and technological know-how for their successful accomplishment. This support is provided by the Office of Naval Research by conducting research, by performing technical coordination, and by providing a number of services on a Navy-wide basis, including Navy participation in all joint defense research projects being carried out among the services. This program is accomplished by means of contracts with commercial and industrial laboratories, with universities and other nonprofit laboratories and institutions, and in Navy laboratories, the object being to obtain the best possible research results in the most economical manner.

The total funds requested are based on a detailed listing of research and development requirements which have been carefully screened and evaluated so that only those projects which contribute to a well-balanced overall research and development program are included. Details of the projects comprising this budget activity are classified for security reasons and are presented separately in a classified supplement to the budget estimates for fiscal year 1960.

Budget activity No. 2—Bureau of Aeronautics—comparative new obligational authority by budget project

Number	Project	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Difference, increase (+) or decrease (−), fiscal year 1960 compared with fiscal year 1959
2A	Military sciences	$6,145,678	$4,466,783	$6,286,549	+$1,819,766
2B	Aircraft and related equipment	104,271,574	107,059,890	103,117,992	−3,941,898
2C	Missiles and related equipment	46,214,699	84,519,280	109,791,379	+25,272,099
2D	Ships and small craft and related equipment	14,395,389	16,286,381	14,354,420	−1,931,961
2E	Ordnance, combat vehicles, and related equipment				
2F	Other equipment	6,475,336	7,998,026	6,186,660	−1,811,366
	Total comparative new obligational authority	177,502,676	220,330,360	239,737,000	+19,406,640
	Net adjustment for comparative transfers	−17,229,340	−35,727,360		+35,727,360
	Total new obligational authority in budget document	160,203,336	184,603,000	239,737,000	+55,134,000
	Add comparative transfer of obligations from other accounts	17,156,840	35,735,360		−35,735,360
	Less obligations to be incurred in subsequent years	445,130	5,011,250	8,757,425	+3,746,175
	Obligations against current-year funds	176,915,046	215,327,110	230,979,575	+15,652,465
	Add obligations against prior-year authority	7,597,062	2,706,250	5,011,250	+2,305,000
	Proposed transfer of obligations against prior-year authority from other accounts			3,502,175	+3,502,175
	Total direct obligations in budget document	184,512,108	218,033,360	239,493,000	+21,459,640

1958 actual	$177,502,676
1959 estimate	220,330,360
1960 estimate	239,737,000

The objective of the Bureau of Aeronautics research and development program is to provide aircraft and guided missile weapon systems and associated component equipments which will enable Naval Aviation to perform its role in continuing Navy mastery of the sea and the air above it. The achievement and maintenance of technical superiority is vital to this objective and requires sustained, intensive effort to develop and improve the operational capabilities of Naval and Marine Aviation weapon systems if the fullest possible exploitation of their proven striking power and flexibility is to be realized.

Funds appropriated for the Bureau of Aeronautics budget activity finance the contractual cost of design, development, and test of aircraft, guided missile, powerplant, electronic, and other component and related equipment prototypes; developmental and test work at naval facilities; and related developmental work performed by other services and outside agencies from which Naval Aviation will derive substantial benefit. In line with the appropriation structure revision whereby the "Research and development, Navy" appropriation has become "Research, development, test, and evaluation, Navy," the scope of this budget activity has been broadened to include funding, responsibility for ground instrumentation and structural repairs at research and development stations, and contractual and station costs associated with the evaluation and test of catapults and arresting gear. The ground instrumentation program was previously carried under the "Aircraft and related procurement, Navy" account and the structural repairs and catapult and arresting gear evaluation programs were funded from "Aircraft and facilities, Navy."

The Bureau of Aeronautics 1960 program of $239.7 million is adequate to maintain on an austere basis those continuing projects which are considered most likely to produce the improvements needed to increase the combat capa-

bility of aviation weapon systems and to initiate those new projects urgently required to meet new tactical concepts. Care has been exercised to achieve balance within the aviation research and development program and to coordinate developmental accomplishment with plans for procurement and tactical use of equipment.

Details of the projects comprising this budget activity are classified for security reasons and are presented separately in a classified supplement to the Budget estimates for fiscal year 1960.

Budget Activity No. 3—Bureau of Ships—Comparative new obligational authority by budget project

Number	Budget activity	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Difference, increase (+) or decrease (−), fiscal year 1960 compared with fiscal year 1959
3A	Military sciences	$10,632,000	$10,163,000	$10,297,000	+$134,000
3B	Aircraft and related equipment				
3C	Missiles and related equipment	914,500	1,530,000	2,185,000	+655,000
3D	Ships and small craft and related equipment	109,747,719	133,243,000	13,373,000	+7,130,000
3E	Ordnance, combat vehicles and related equipment				
3F	Other equipment	6,247,781	11,523,000	13,035,000	+1,512,000
	Total comparative new obligational authority	127,542,000	156,459,000	165,890,000	+9,431,000
	Net adjustment for comparative transfers	−40,012,000	−36,170,000	0	+36,170,000
	Total new obligational authority in budget document	87,530,000	120,289,000	165,890,000	+45,601,000
	Add: Comparative transfer of obligations from other accounts	39,967,000	36,170,000		−36,170,000
	Less: Obligations to be incurred in subsequent years	1,559,660	3,265,660	3,265,660	0
	Obligations against current-year funds	125,937,340	153,193,340	162,624,340	+9,431,000
	Add: Obligations against prior-year authority	2,368,115	1,559,660	3,265,660	+1,706,000
	Proposed transfer of obligations against prior-year authority from other accounts			900,000	+900,000
	Total direct obligations in budget document	128,305,455	154,753,000	166,790,000	+12,037,000

INTRODUCTION

In keeping with its mission of providing the operating forces with the best in ships and associated supporting services, the Bureau of Ships fiscal year 1960 research and engineering program has been planned to provide a balanced program of fundamental research, supporting research, development, test, and evaluation to improve fleet readiness and future Navy capabilities. The wide range of Bureau responsibilities requires that a broad and comprehensive effort be devoted to all phases of the program.

The program includes fundamental research to provide new knowledge and skills needed for the solution of the many problems associated with the successful employment of ships, missiles, and nuclear power in modern naval warfare. The planning in this area includes work in hydromechanics and research for new and better materials which will withstand the high temperatures and radiation fluxes associated with the use of future ship and weapon systems. Nuclear propulsion technology will be studied intensively. Research leading to the protection of personnel aboard ship against the effects of nuclear, biological, and chemical weapons will be conducted. Studies of new methods of power generation and ship propulsion are planned.

Planning for supporting research has been tailored to counter the threat posed by our potential enemies and to provide technical knowledge in functional

fields of naval interest which is needed to determine the types of specific end items to be developed. This effort is directed to the investigation of those areas which show promise of contributing to the most advanced offensive and defensive naval warfare systems. Provisions have been made to conduct research on problems associated with the long-range detection, identification, tracking, and classification of submarines, to study more precise methods of navigation, tactical data processing through use of computer technology; and, through research, to improve transistors and other electronic components to withstand the ever-increasing temperature and shock requirements demanded in the nuclear and missile age. The use of nuclear devices in lieu of chemical explosives in mines and torpedoes necessitates solution of difficult problems of mine and torpedo detection and destruction, underwater demolition, and explosive ordnance disposal.

The development phase of the fiscal year 1960 program constitutes the major portion of our research and engineering effort. The development includes a long list of highly desirable weapon and supporting systems critical to the adequacy and effectiveness of the Navy in a future war. Emphasis is placed on systems supporting antisubmarine warfare. These efforts will provide improvements in submarine detection and tracking systems, air surveillance systems, mine countermeasures systems, communications and electronic warfare systems, and in nuclear-powered surface ships and submarines.

The final steps of test and evaluation of newly developed equipment to provide new weapons to the operating forces are now included in this program. This includes the engineering design and procurement of new and improved component and system prototypes, utilizing the latest in design, materials and engineering concepts, and the laboratory testing and operational evaluation of these prototypes.

REPORT ON PROGRAM ADMINISTRATION

Fiscal year 1959 has seen substantial progress toward the solution of problems posed by changes in naval warfare concepts, by the potential threats of new and improved weapons, and by our own technological advances. The land-based prototypes of the reactors for the nuclear-powered aircraft carrier began operating successfully. Research and development in antisubmarine warfare continues to hold top priority in the Bureau of Ships program. New sonar developments, both shipborne and fixed, active and passive, are entering the evaluation stage. Development was completed on improved air search radars for scheduled new construction, and research was continued to extend ranges, and to improve capacity to handle increased speed and numbers of targets. The problem of fleet coordination and communication was vigorously attacked, with particular emphasis on the Navy tactical data system for collection, exchange, evaluation, and display of data, and on high-speed, high-capacity, secure communications systems. The areas of electronic countermeasures received constant study to keep pace with the electronics developments. In the area of submarine operations, research on noise reduction holds high priority. The polar trips by the *Nautilus* and *Skate* provided invaluable information on performance of equipment and on the need for new and improved equipment for Arctic operations.

MAJOR PROGRAM AND FUNDING CONSIDERATION IN FISCAL YEAR 1960

The development of nuclear propulsion power for surface ships and additional types of submarines is still a prominent part of our research and development program. Increased emphasis has been placed on ASW, fleet air defense, communications, and weapon countermeasures. An increase may be observed in the development of the Naval tactical data system as it approaches the operational evaluation stage, Increased effort is planned in the area of amphibious warfare, underwater demolition, explosive ordnance disposal, and air surveillance systems.

In order to provide a well-balanced research and engineering program, a considerable amount of supporting research is required. Consequently, an examination of the fiscal year 1960 program will reveal that the planning provides for the development of new materials required for end-items development. Special alloys and dielectrics to withstand radiation fluxes are being developed for use in connection with the application of nucelar energy. The requirement for stowage and handling of guided missiles aboard our ships has necessitated

a search for additional means of protection of both ships and crew. The development of a primary fuel cell battery and the attempt to apply solid state physics to generate electrical energy for quiet ship propulsion will receive a considerable amount of attention. Success in this area would be of paramount importance to our antisubmarine warfare capability.

Project No. 3A—Military sciences

1958 actual	$10,362,000
1959 estimate	10,163,000
1960 estimate	10,297,000

PURPOSE AND SCOPE OF WORK

The work under this project covers supporting research in the development of materials and processes for military applications.

JUSTIFICATION OF FUNDS REQUESTED

The funds requested in this project will be used for the development of improved welding of hull steels for deeper diving submarines and underwater explosion resistance of ships, reliability of electronic components, radioisotopes, nonmagnetic metals, gas turbine alloys, elastomers, thermal insulation packing and gaskets, special chemicals, protective coatings and corrosion prevention research on insecticides and fumigants, statistical methods in quality control, human engineering training devices, and oceanographic information. Most of the increase is for research on electronic tubes and parts, as directed by the Secretary of Defense.

Project No. 3C—Missiles and related equipment

1958 actual	$914,500
1959 estimate	1,530,000
1960 estimate	2,185,000

PURPOSE AND SCOPE OF WORK

This project provides the research and engineering for support of shipboard guided missile systems.

JUSTIFICATION OF FUNDS REQUESTED

Funds are requested for development of improved reliable high-temperature electronic components, which are required to satisfy the extreme environmental conditions and much greater strain on such equipment which is encountered in the missile field. The types of components needed for this purpose include transformers, transducers, motors, capacitors, electronic networks, storage devices, computer generators, low frequency crystals, and large electronic tubes for carrying much greater current.

In addition to the above, $150,000 is planned for radar assisted guidance.

Project No. 3D—Ships and small craft and related equipment

1958 actual	$109,747,719
1959 estimate	133,243,000
1960 estimate	140,373,000

PURPOSE AND SCOPE OF WORK

This project represents the major portion of the Bureau of Ships research and engineering program. It covers work on hull design; main propulsion and auxiliary machinery, including nuclear reactors; equipment and fittings; electronics, including air defense, antisubmarine warfare and communications; electronic countermeasures; mine and torpedo countermeasures; ship control; and reduction of ship noise, particularly in nuclear submarines.

JUSTIFICATION OF FUNDS REQUESTED

The funds requested are required for timely completion of projects necessary to support newly conceived weapons and support systems and to increase the knowledge leading to the development of future systems.

The Bureau of Ships program places particular emphasis on antisubmarine warfare. Some major projects in air defense will be nearing completion; however, studies leading to solution of remaining problems will continue.

Emphasis in the field of ship design is directed to the development of new and improved ship forms and large high-speed hydrofoil craft for reduced resistance and quieter operation. Improvements will be sought in resistance of ships to underwater explosion and in their ability to operate in ice fields.

Development of nuclear propulsion techniques and equipment is being continued to meet requirements in both surface ships and submarines. Support in this area remains level.

Funds are needed to develop materials, components, and fabrication techniques for quiet machinery for application with nuclear propulsion. Methods for the direct transformation of thermal to electrical energy are being investigated in order to reduce the number of moving parts and thus provide quieter ships.

The reduction of noise in movable parts of ship's machinery is continually being pushed. Projects in the electronics program include new communication techniques with improved high-capacity circuits, development of data handling and processing equipment for the naval tactical data system, control and command systems, improved radar and underwater sound techniques, precise navigation, electronic countermeasures, and antisubmarine warfare systems. Promising areas in the field of mine and torpedo countermeasures will be pursued vigorously.

Funds are requested to develop residual fuels, multipurpose lubricants, high-temperature and high-strength alloys, and dielectrics for high-temperature electronic equipment. The noise-reduction program includes investigation of noise phenomena, isolating noise sources, developing means of reduction of present ships noise, and developing ships that are more inherently quiet. This work is extremely important in the use of ships for antisubmarine warfare.

Extended subsurface operations require increased effort in fundamental studies in habitability. Fundamental studies in atomic, biological, and chemical warfare will be carried out for defense of ships and personnel against such attacks.

Effort will continue in research and engineering on individual components, materials, and techniques for extreme cold weather operations. High-temperature electronic systems are also being developed.

Project No. 3F—Other equipment

1958 actual	$6,247,781
1959 estimate	11,523,000
1960 estimate	13,035,000

PURPOSE AND SCOPE OF WORK

This project finances research and engineering of equipments and their components which are not accounted for under other projects. Typical tasks to be supported are related to electronics for secure communications; amphibious warfare; detection and tracking of targets in antisubmarine warfare; biological and chemical warfare detection, monitoring and shipboard defense; equipment for personnel safety; protection from blast; ship salvage; shallow and deep diving; and the work of underwater demolition teams.

JUSTIFICATION OF FUNDS REQUESTED

The funds requested in this project are for the development of reliable electronics equipment to insure secure naval tactical data system information transfer and other communications. They are also needed to permit increased emphasis on amphibious warfare; submarine detection, tracking, target information and display equipment; shore direction finding and position fixing; supporting research in electronic countermeasures; mine detection location; biological and chemical warfare defense; and nuclear warfare defense under Arctic conditions, and air search radars.

Budget activity No. 4—Bureau of ordnance—Comparative new obligational authority by budget project

Number	Project	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Difference increase(+) or decrease (−) fiscal year 1960 compared with fiscal year 1959
4A	Military sciences	$4,540,093	$5,110,000	$6,202,000	+$1,092,000
4B	Aircraft and related equipment	2,618,190	2,004,200	2,452,000	+447,800
4C	Missiles and related equipment	222,868,146	390,044,629	333,677,000	−56,367,629
4D	Ships and small craft and related equipment	3,316,384	3,432,099	4,424,000	+991,901
4E	Ordnance, combat vehicles and related equipment	66,789,308	87,290,557	92,843,000	+5,552,443
4F	Other equipment	9,401,276	11,273,154	11,592,000	+318,846
	Total comparative new obligational authority	309,533,397	499,154,639	451,190,000	−47,964,639
	Net adjustment for comparative transfers	−76,786,397	−75,201,639		+75,201,639
	Total new obligational authority in budget document	232,747,000	423,953,000	451,190,000	+27,237,000
	Add: Comparative transfer of obligations from other accounts	76,786,397	75,201,639		−75,201,639
	Less: Obligations to be incurred in subsequent years	4,066,112	3,942,266	11,062,129	+7,119,863
	Obligations against current-year funds	305,467,285	495,212,373	440,127,871	−55,084,502
	Add: Obligations against prior-year authority	7,040,709	4,846,266	3,942,266	−904,000
	Proposed transfer of obligations against prior-year authority from other accounts			5,899,863	+5,899,863
	Total direct obligations in budget document	312,507,994	500,058,639	449,970,000	−50,088,639

1958	actual	$309,533,397
1959	estimate	499,154,639
1960	estimate	451,190,000

The Bureau of Ordnance research, development, test, and evaluation program is dedicated to the attainment of major advances in naval weapon system capabilities and to the extension of the bounds of scientific knowledge applicable to ordnance.

The research, development, test and evaluation program proposed by this budget incorporates significant adjustments in the funding responsibilities previously drawn between research and procurement appropriations. The funding responsibilities of previous research and development budgets have been extended to encompass the funding of an acceptable prototype weapon or system and the Bureau of Ordnance test and evaluation of these weapons and systems. This change in funding responsibilities resulted in a shift of $87,042,000 from Bureau of Ordnance procurement and maintenance appropriations to the research, development, test and evaluation program in fiscal year 1960.

Primary emphasis will be directed to areas of deficiency in our naval combat strength and areas in which the anticipated enemy threat is not adequately met by present weapon systems. Paramount among these are the fields of antisubmarine warfare and guided missiles. Revolutionary new concepts are being employed in the development of weapons to meet the threat of enemy submarines. These developments will vastly improve our ability to detect and destroy underwater interlopers at greater ranges, higher speeds and with improved accuracy. The fleet ballistic missile (POLARIS) continues as the No. 1 priority program within Navy. Emphasis is also being continued on the TERRIER, TARTAR, TALOS family of air defense missiles and the SIDEWINDER air-to-air missile.

This budget will provide for a program of supporting research; for the development of complete weapon systems through a satisfactory prototype and design release to production; for the Bureau of Ordnance test and evaluation

of these systems; and for the correction of deficiencies in reliability and safety of existing weapons. Supporting research provides the groundwork for the introduction of new weapon system concepts and new weapon applications designed to maintain future naval supremacy. The development phase provides for applied research, development, engineering, and fabrication of prototype models, and preparation and release of designs to production. The test and evaluation function provides the assurance that a weapon is ready for production. Finally, the correction of deficiencies of service-use weapons is based upon fleet reports and is maintained at a minimum level.

Details of the projects comprising this budget activity are classified for security reasons and are presented separately in a classified supplement to the budget estimates for fiscal year 1960.

Budget activity No. 5—Bureau of Medicine and Surgery—Comparative new obligational authority by budget project

No.	Project	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Difference, increase (+) or decrease (−) fiscal year 1960 compared with fiscal year 1959
5A	Military sciences	$4,456,000	$4,785,000	$4,782,000	−$3,000
5B	Aircraft and related equipment				
5C	Missiles and related equipment				
5D	Ships and small craft and related equipment				
5E	Ordnance, combat vehicles and related equipment				
5F	Other equipment	18,000	17,000	18,000	+1,000
	Total comparative new obligational authority	4,474,000	4,802,000	4,800,000	−2,000
	Net adjustment for comparative transfers				
	Total new obligational authority in budget document	4,474,000	4,802,000	4,800,000	−2,000
	Add: Comparative transfer of obligations from other accounts				
	Less: Obligations to be incurred in subsequent years	385,199	130,708	130,708	
	Obligations against current-year funds	4,088,801	4,671,292	4,669,292	−2,000
	Add:				
	Obligations against prior-year authority	382,784	410,708	130,708	−280,000
	Proposed transfer of obligations against prior-year authority from other accounts				
	Total direct obligations in budget document	4,471,585	5,082,000	4,800,000	−282,000

INTRODUCTION

This budget activity provides for all costs related to the conduct of the Bureau of Medicine and Surgery research and development program. These include (*a*) maintenance and operation of inservice research activities; (*b*) contractual services for basic and applied research studies; (*c*) procurement of special items required for research and development functions; (*d*) fabrication of working and/or prototype models required in the conduct of special studies; (*e*) other contractual services; (*f*) supplies, including first destination transportation; and (*g*) other identifiable research and development costs.

REPORT ON PROGRAM ADMINISTRATION

The research and development program of the Bureau of Medicine and Surgery embraces studies in the fields of aviation medicine, shipboard and submarine medicine, general medicine and surgery, dental medicine, field medi-

cine, atomic and special weapons medicine, environmental and survival medicine, and the medical defensive aspects of atomic, chemical, and biological warfare. In order to carry out such a broad program effectively, research units have been established both in this country and in strategic locations abroad. In addition, facilities of other Government agencies, colleges, universities, nonprofit institutions, and private industry are utilized. This type of utilization is based on employing the best manpower and facilities on individual projects for which they are best suited. Program guidance is obtained from the National Research Council, especially the Committee on Naval Medical Research, the Armed Forces Epidemiology Board, the Office of Naval Research, and the Research and Development Committees and Panels of the Department of Defense. Coordination is accomplished through the Research and Development Coordinating Committee of the Department of Defense. Some of the many program accomplishments are as follows:

Systems and techniques for transmitting physiological measurements from subjects in airplanes, ships at sea, space vehicles, and remote parts of the earth to the National Naval Medical Center, using standard communication circuits, have been completed. These systems permit a variety of physiological measurements such as heart sounds, breath sounds, electrocardiogram, electroencephalogram, respiratory rate, respiratory volume, pulse rate, and blood pressure to be received by radio from the aerial or space vehicle, fed into common telephone circuits at any location on the earth, and transmitted to the National Naval Medical Center at Bethesda, Md. Low-cost receivers can be placed at selected places about the earth to feed information into common communication telephones and radios for simultaneous transmission back to the Medical Center. This system will permit continuous monitoring of pilots and passengers of airplanes and space vehicles circling or orbiting the earth.

A guide has been formulated and published which will materially assist submarine officers in assigning men to sonar listening duties. It is anticipated that the results of this research will improve the military position of the United States by enhancing the effectiveness of sonar devices.

Further information has been published regarding the effective prolonged exposure to carbon dioxide. This information contributes to the fund of knowledge required in the operation of nuclear submarines.

Specific accomplishments which were of direct service to the fleet included toxicological evaluations of three hydraulic fluids which were being considered for use abroad nuclear-powered submarines. This expedited the selection of the most suitable material with the lowest inherent toxicity, and thereby eliminated costly changes in hardware during an advanced stage of development.

The transplantation of animal tissues from one animal to that of another species results in many complicated, immune problems and usually results in the rejection of the new tissues by the host. Experience has shown that embryonic tissues are less antigenic and cause less disturbance in animals of different species than adult tissues. Surgeons of the Naval Medical Research Institute have removed sections of blood vessels of a dog and replaced them with blood vessels of bovine embryos. Animals treated in this manner have lived as long as 15 months. The success with this type of tissue graft may represent a breakthrough in tissue transplantation studies.

The Navy, in cooperation with the other armed services, has supported the Protein Foundation in studies of long-term preservation of glycerized blood cells. A laboratory for evaluation of such blood has been set up at the U.S. Naval Hospital, Chelsea, Mass. The preserved blood has been successfully used, and clinical evaluation shows that such preserved blood cells are useful where replacement is required from any cause.

In radiation treatment, a major breakthrough was accomplished by demonstrating that cell-free extracts from mouse spleen were able to protect lethally irradiated guinea pigs.

MAJOR PROGRAM AND FUNDING CONSIDERATIONS IN FISCAL YEAR 1960

The atomic medicine program supported by the Bureau of Medicine and Surgery is designed to study the biological effects of ionizing radiation that would be associated with an atomic detonation, together wtih various problems related to the detection, effects, and therapy of radiation illness as it applies to various naval uses of atomic energy. Increased research incident to the installation of a medical nuclear reactor and the construction of a radiation evaluation and treatment center represents a major portion of the planned fiscal

year 1960 atomic medicine program. This project does not duplicate those conducted by the Atomic Energy Commission or its contractors and represents this Bureau's total effort in the field of atomic medicine.

The medical problem of undersea warfare is being met by studying the physiological stresses incurred in submarine operations, diving, and underwater swimming. This includes investigation of submarine atmosphere, study of escape from disabled submarines, investigation of devices for escape and aspects in training of personnel in escape procedures. One of the studies of this program relates to breathing mixtures for underwater demolition teams and study of the general habitability of submarines and the effect of adverse weather and sea conditions. Engineering advances and new techniques resulting in greater underwater endurance of submersible craft and underwater swimmers have introduced environmental stresses for which personnel tolerance must be determined in order that remedial measures to effect adaptation with maximum operating efficiency may be devised.

In the field of aviation medicine there are many problems to be solved in order to keep the operator and occupants of high, fast-flying aircraft abreast or ahead of engineering advances and achievements. One such problem being studied is the stress due to G-forces imposed upon the human operator by the tremendous overload of lineal and radial accelerative and decelerative forces developed in tactical maneuvers in evasive and offensive action and flight operations. This includes studies of physiology, design, and evaluation of protective equipment, and pathological effects of accelerative forces on human tissue and organs. Other problems being investigated by the Bureau of Medicine and Surgery are physiological and psychological effects of cosmic radiation in high-altitude flights and physiological and psychological effects on pilots due to the loss of cabin pressure at high altitudes.

The development of material, equipment, and techniques for the military application of preventive medicine is the objective of this Bureau's program in preventive medicine. It embraces studies of malaria parasites, human schistosomes, dysentery, viral infections, immunological response to vaccines, respiratory infections, vectors of disease and geomedical surveys. The two major increases in this program are requested to implement the new Virology Research Division at the Naval Medical Research Institute, Bethesda, Md., and the implementation of the newly established laboratory at Taipei, Taiwan, with is ongoing program. The installation at Taipei has existed for 2 years on a minimal basis to allow for construction, organization, and staff acquisition, and is now ready to actively pursue its designated mission.

The Bureau of Medicine and Surgery has been called on to evaluate health problems resulting from the use of new substances in construction. Emergency evaluation of the toxic hazards from such new materials was carried out at the Naval Medical Research Institute, Bethesda, Md. These studies, which were important to the construction program, were performed in a minimum of time and in a manner not available from usual channels. Similar studies on the problems resulting from the use of new fuels and solid propellants are underway. Such operational studies are possible through the combined efforts and cooperation of scientists representing different disciplines available at the Naval Medical Research Institute.

The Bureau of Medicine and Surgery supports a program in General and Military Medicine that is designed to continually develop improved techniques, methods, and materials for the treatment and rehabilitation of all casualties. It includes such studies as (1) the use of preserved tissue in surgery; (2) transplantation of organs; (3) protection and therapeutic measures for treatment of burns; and (4) preservation of whole blood. One of these studies concerns anorganic bone. This process, developed by naval medical research laboratories utilizing animal bone, an item in plentiful supply, will make possible a stockpile of preserved tissues which promises to revolutionize orthopedic surgery. Another study, located at U.S. Naval Hospital, Oakland, Calif., is concerned principally with the development of a new substance known as bone adhesive, which provides a physiological splint that can be surgically applied in the treatment of fractures to effect immediate rehabilitation. Development so far has employed the use of this substance in animals that will permit weight bearing on the 3d postoperative day without any appreciable host reaction.

Project No. 5A—Military Sciences

1958 actual	$4,456,000
1959 estimate	4,785,000
1960 estimate	4,782,000

PURPOSE AND SCOPE OF WORK

This project will provide the necessary funds for the support of a major portion of the Bureau of Medicine and Surgery research and development program which is designed to provide the necessary scientific and technological advances in the medical, dental, and allied science fields that are required to aid in solving those problems affecting the health, safety, selection, and efficiency of the personnel in the naval service.

JUSTIFICATION OF FUNDS REQUESTED

Funds in the amount of $4,782,000 are requested for the support of 32 research and development projects in the fields of aviation medicine, shipboard and submarine medicine, field medicine, general medicine and surgery, dental medicine, atomic and special weapons medicine, environmental and survival medicine and the medical defensive aspects of atomic, chemical and biological warfare. A detailed listing of these projects has been submitted as a classified document to the Chief of Naval Operations for review by the Navy Research and Development Review Board. Many of the subjects under investigation are the logical pursuit of recognized problems which have resulted from a rapidly improved weapons system; others are in fields which give promise to remove the threat of disease and other harzards to which our personnel are or may be normally exposed; and still others in fields which are designed to protect our personnel from the effects of newly developed instruments of warfare. Emphasis has been placed on those projects which are in support of current operational requirements and which promise a substantial improvement in the field of military medical science.

Project No. 5F—Other Equipment

1958 actual	$18,000
1959 estimate	17,000
1960 estimate	18,000

PURPOSE AND SCOPE OF WORK

This project provides for the support of research and development of special items of equipment, such as protective clothing and protective equipment for the eyes and ears, in order to meet the operational needs of the personnel in the naval service.

JUSTIFICATION OF FUNDS REQUESTED

Funds requested under this budget project will provide support of a Bureau of Medicine and Surgery research project located at the Naval Medical Research Laboratory, New London, Conn. Under this project, field evaluations of newly developed items of protective clothing for use by submarine personnel will be conducted and new specifications developed. In addition, evaluations of protective equipment for the eyes wil be conducted in order to ensure that specifications as to color, absorption characteristics and optical qualities are fulfilled. In support of this Bureau's hearing conservation program, the latest types of ear protective equipment will also be evaluated in order that the best equipment can be made available for fleet use.

Budget activity No. 6—Bureau of Yards and Docks—Comparative new obligational authority by budget project

Number	Project	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Difference, increase(+) or decrease (−), fiscal year 1960 compared with fiscal year 1959
6A	Military sciences	1,330,000	1,369,000	1,344,000	−25,000
6B	Aircraft and related equipment				
6C	Missiles and related equipment				
6D	Ships and small craft and related equipment				
6E	Ordnance, combat vehicles and related equipment				
6F	Other equipment	2,355,499	2,439,000	2,639,000	+200,000
	Total comparative new obligational authority	3,685,499	3,808,000	3,983,000	+175,000
	Net adjustment for comparative transfers	−423,499	−283,000	0	+283,000
	Total new obligational authority in budget document	3,262,000	3,525,000	3,983,000	+458,000
	Add: Comparative transfer of obligations from other accounts	423,499	283,000	0	−283,000
	Less: Obligations to be incurred in subsequent years	−64,518	−95,518	−95,518	0
	Obligations against current-year funds	3,620,981	3,712,482	3,887,482	+175,000
	Add:				
	Obligations against prior-year authority	178,698	64,518	95,518	+31,000
	Proposed transfer of obligations against prior-year authority from other accounts	0	0	0	0
	Total direct obligations in budget document	3,799,679	3,777,000	3,983,000	+206,000

INTRODUCTION

The purpose of budget activity 6, Bureau of Yards and Docks, is to support that part of the Bureau of Yards and Docks' mission which is concerned with new and improved equipment items and systems related to construction and operation of advance bases; changing requirements in design and construction; and for maintenance and operation of U.S. Naval Civil Engineering Laboratory, Port Hueneme, Calif. (NCEL).

REPORT ON PROGRAM ADMINISTRATION

Significant progress has been made in the development of new or improved items of equipment which have been accepted into logistic systems related to amphibious operations support. Two noteworthy items are: 21-foot-wide end-to-end connected causeway which permits two-way traffic for the transfer of cargo from landing craft as well as having the capability of handling the heaviest offensive land weapons. The second item is the bottom-laid ship-to-shore fuel line. Advancement in the techniques of chemical biological radiological contamination protection and facility recovery have also been achieved. A device which simulates the effect of atomic blast on structural elements has been installed at the Bureau's managed research laboratory. Its use will inexpensively verify a multitude of theoretical studies and expedite the completion of urgently needed design criteria. A span of small tasks in the science of civil engineering is also progressing well.

MAJOR PROGRAM AND FUNDING CONSIDERATIONS

Programs being emphasized during fiscal year 1960 include a multipurpose harbor unit; improved methods and techniques of radiological decontamination; improved firefighting agents; preservative materials and techniques; elimination of stray electronic radiation as generated by construction equipment and

transmission lines; and applicable specific studies in the science of civil engineering.

Project No. 6A—Military sciences

1958 actual	$1,330,000
1959 estimate	1,369,000
1960 estimate	1,344,000

PURPOSE AND SCOPE OF WORK

This budget project provides for the research and development effort required in support of that part of Bureau of Yards and Docks' mission related to the changing requirements in the design, construction and maintenance of the Naval Shore Establishment.

JUSTIFICATION OF FUNDS REQUESTED

The tasks which compose this submission have been approved by the Office of the Chief of Naval Operations, Research and Development Review Board. These tasks include radio interference elimination; corrosion prevention materials and techniques; pest control; continued investigation into marine organism controls; structural materials subjected to dynamic and thermal forces produced by nuclear weapons, and protective shelters.

Funds are provided under this project for the operation of NCEL as required to support research projects assigned under this category.

Project No. 6F—Other equipment

1958 actual	$2,355,499
1959 estimate	2,439,000
1960 estimate	2,639,000

PURPOSE AND SCOPE OF WORK

Funds requested under this project are required to execute a minimum acceptable research, development, test and evaluation program in support of that part of Bureau of Yards and Docks' mission which is concerned with new and improved equipment items and systems related to construction and operation of the Naval Shore Establishment, including advance bases.

JUSTIFICATION OF FUNDS REQUESTED

The tasks which compose this submission have been approved by the Research and Development Review Board of the Office of the Chief of Naval Operations. These tasks delineate specific areas where significant improvement over existing equipment and systems is needed to meet current requirements. They encompass further investigations in floating gear for use by construction forces working in harbors and off shore; arctic climatic engineering problems, and the adoption of equipment for solving such problems.

Funds are provided under this project for the operation NCEL as required to support research projects assigned under this category.

Approximately 50 percent of the research and development program and 75 percent of the engineering and commercial product evaluations required by the Bureau of Yards and Docks are accomplished at NCEL.

The support of direct research and development procurement, and the test and evaluation of the products of research and development is an integral part of the whole program. It is essential for the successful accomplishment of the research and development program and the prudent expenditures of subsequent procurement funds.

Budget activity No. 7—Bureau of Supplies and Accounts—Comparative new obligational authority by budget project

No.	Project	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Difference, increase(+) or decrease (−), fiscal year 1960 compared with fiscal year 1959
7A	Military sciences	$613,000	$1,714,000	$1,600,000	−$114,000
7B	Aircraft and related equipment				
7C	Missiles and related equipment				
7D	Ships and small craft and related equipment	101,000	178,000	214,000	+36,000
7E	Ordnance, combat vehicles, and related equipment				
7F	Other equipment	233,000	372,000	366,000	−6,000
	Total comparative new obligational authority	947,000	2,264,000	2,180,000	−84,000
	Net adjustment for comparative transfers				
	Total new obligational authority in budget document	947,000	2,264,000	2,180,000	−84,000
	Add: Comparative transfer of obligations from other accounts				
	Less: Obligations to be incurred in subsequent years	37,027	61,204	61,204	
	Obligations against current-year funds	909,973	2,202,796	2,118,796	−84,000
	Add: Obligations against prior-year authority	32,821	96,204	61,204	−35,000
	Proposed transfer of obligations against prior-year authority from other accounts				
	Total direct obligations in budget document	942,794	2,299,000	2,180,000	−119,000

INTRODUCTION

In recent years, vast changes have occurred in the Navy's striking forces through technological development of new weapons, new ships, and new methods of warfare. Even more dramatic changes are foreseen. The Navy's logistic system must be altered to keep pace with these new conditions. Basic research in the management sciences has in the last 5 years provided new ideas and tools as revolutionary as those of nuclear physics and electronics. The Bureau of Supplies and Accounts is conducting a research and development program to exploit the latest scientific techniques—operations research, linear programing, system probability analysis, etc.—to determine optimal decision rules and policies in the business management of the Navy. Basic theoretical work from leading universities is applied and modified to yield practical operating rules for our logistics system.

Coupled with this intensive program is the Bureau of Supplies and Accounts material research and development program in the fields of (1) supply engineering, which includes the development of new logistics equipment in support of new concepts of amphibious assault, assisting in the design and layout of supply spaces in new ship construction, development ultimately of a complete mechanized warehouse and terminal operation, and research in new packaging and preservation techniques; (2) commissary research, which develops optimum food service equipment and layout for new ship construction and ship alteration, develops new types of rationing to meet increased endurance capabilities of nuclear-powered ships, conducts mess manpower and industrial engineering studies and designs new scullery equipment and scullery techniques for sanitation; and (3) clothing and textile research to provide new or improved textiles and related materials; occupational, and combat and environmental protective clothing for Navy shipboard and submarine personnel.

REPORT ON PROGRAM ADMINISTRATION

Administration of the program has provided the following achievements with the funds available:

(*a*) In the areas of logistic research and advanced supply system analysis, a complete long-range plan for research was disseminated which met with uniformly favorable comment from fleet and operating commands. Specific research studies provided new formulas for decisions between procurement and redistribution of general stores material and between repair and disposal of used aviation items. A complex formula to decide between making aviation items consumable or repairable was developed into a simple approximation for installation at the Aviation Supply Office. A broader model combining procurement and redistribution decisions is being developed by the Stanford Research Institute. Model allowance lists for ships are being developed by the statistical analysis of a vast collection of usage data. Each specific project will raise the efficiency and lower the cost of supporting our essential military operations.

(*b*) In cargo handling, packaging and distribution of supplies, major improvements have been effected in the capabilities of combatant ships to receive cargo and in the speed of unloading supply ships during transfer at sea. Mechanical devices and systems developed permit a smooth flow of cargo, thereby increasing speed and reducing personnel fatigue. Packaging and preservation methods and testing techniques have been developed to extend the life of materials and equipment in storage under all conditions and in transit. Economies in both materials and supply operations result.

(*c*) In commissary research there have been significant accomplishments in improved galley layouts for new ship construction and ship alterations. Evaluations and development of galley and food service equipment have resulted in more efficient food preparation and service for combat as well as peacetime conditions. Studies of mess manpower utilization through surveys of operating Navy and commercial feeding establishments, coupled with industrial engineering studies, have shown means to reduce manpower requirements in food operations. Testing of new foods of increased ration density has led to the development of subsistence loads for ships to provide the necessary food endurance for long cruises as well as meet the habitability requirements.

(*d*) Research and development of clothing and textiles has continued to make significant contributions to improve the protection afforded naval personnel against extreme environmental, occupational hazards, and unconventional weapons. Research and material promises to provide greater utility, improved wear life and a decrease in the need for potentially strategic and critical items.

MAJOR PROGRAM AND FUNDING CONSIDERATIONS IN FISCAL YEAR 1960

The requirements for research and development of the Navy supply system and its material equipment and techniques represent continuing program objectives. These objectives are revised annually on the basis of past accomplishments, new requirements for fleet readiness, new concepts in warfare, and the promise of current research and development. The Navy must have an adequate supporting logistic system so that vessels may possess definitive and optimum endurance capability at all times. To achieve this end, replenishment processes must be accelerated, logistic support vessels' stocks must be logically related to vessel allowances, and the allowances themselves must be based upon sound criteria which ensure optimum use of available space. The equipment configurations which the supply system must support, as well as the supporting materials themselves, are becoming increasingly more complex, more costly, and more difficult to procure. Continued emphasis, therefore, must be placed on more scientific methods of supply management in order to achieve tighter, more responsive control over the procurement, distribution, maintenance and issue of stocks.

Project No. 7A—Military sciences

1958 actual	$613,000
1959 estimate	1,714,000
1960 estimate	1,600,000

PURPOSE AND SCOPE OF WORK

The purpose of the program is to carry forward a logistic research plan which will provide the Navy with greatly improved, more effective and less costly means of supporting current and future strategic and tactical requirements. Work will be conducted in the application of mathematical and statistical techniques to the whole range of decision-making processes in the areas of procurement, redistribution, repair, disposal, distribution patterns, demand forecasting, and utilization of air cargo; research and development of material systems to expedite mobile logistic support and studies in the mechanization of shipboard stowage spaces; conservation of shipboard spaces and increase of vessel endurance through the use of concentrated food items, and studies to improve mess manpower utilization; investigation of methods and processes to improve the utility of textile materials and to conserve potentially strategic and critical items.

JUSTIFICATION OF FUNDS REQUESTED

Funds are required to pursue the following specific projects:

(1) Studies of stock and safety level policies.

(2) Studies of repairability and maintenance decisions.

(3) Development of model allowance lists and load lists and associated military essentiality criteria.

(4) Investigation of afloat data processing techniques.

(5) Flow of aircraft program planning data.

(6) Assembly and maintenance of logistics reference data.

(7) Adaptation of linear programing techniques to practical inventory control problems.

(8) Measurement of supply effectiveness.

(9) Studies of multiechelon supply systems.

(10) Studies of deferred procurement, increasing information models and obsolescence.

(11) Development of cost data inputs for inventory models.

(12) Studies of the use of premium transportation.

(13) Development of greatly improved strikedown capability on combatant ships.

(14) Development of materials handling systems and equipment in support of underway replenishment by means of helicopters.

(15) Development of a submerged fuel cache.

(16) Development of maximum mechanization for storerooms afloat in all types of ships.

(17) Continuing investigation to improve functional treatments for textile materials to impart flame-resistance, antistatic properties, and special properties to meet new operational needs.

(18) Evaluation of the use of ration dense foods to improve vessel endurance while retaining high nutritional value and palatability.

(19) Investigation of means to conserve manpower used in the preparation and service of food in messes afloat and ashore.

Project No. 7D—Ships and small craft and related equipment

1958 actual	$101,000
1959 estimate	178,000
1960 estimate	214,000

PURPOSE AND SCOPE OF WORK

The purpose of research and development under this category is to make galley operations and the preparation and service of food in the Navy as efficient and habitable as possible so that Navy personnel will continue to receive appetizing and nutritionally adequate diets, under the increased personnel demands of modern naval operations.

JUSTIFICATION OF FUNDS REQUESTED

Funds are required under this project to develop improved galley layouts and equipment which will make the most efficient use of the available space and personnel. Conservation of space aboard ship and the increasing need for specialists in new weapon systems and related support factors dictate that the

most effective functional use be made of equipment while still retaining or improving habitability features. A system of modular items of galley equipment is to be developed with a view to simplifying and improving the design and logistics aspects of Navy commissary operations.

Project No. 7F—Other equipment

1958 actual	$233,000
1959 estimate	372,000
1960 estimate	366,000

PURPOSE AND SCOPE OF WORK

The purpose and scope of work under this project covers two research and development programs, as follows:

(*a*) Clothing and textiles research and development to provide naval shipboard personnel with improved protection against extreme environments, occupational hazards, and unconventional weapons; to develop substitutes for potentially critical and strategic materials and to improve the durability and functional utility of textile materials to meet special Navy requirements; and

(*b*) Automated and mechanized supply facilities, to develop equipment for rapid receipt and issue of naval stores and material in warehouses ashore and a highly mechanized issue type barge for enabling issue of needed material to a highly dispersed fleet or as substitute for ashore facilities.

JUSTIFICATION OF FUNDS REQUESTED

The funds requested under this project are considered essential to support the objectives of the two programs for the following reasons:

(*a*) Clothing and textile research and development: This program is confined to special operational requirements of the Navy which are outside the area of usual interests of industrial research and development of clothing and textiles to meet the needs of the civilian economy. Special clothing is required for shipboard personnel under cold weather operating conditions, to provide waterproofness and buoyancy in the water, escape suits for submarines, and protective clothing and materials to reduce the hazard from atomic, biological, and chemical warfare and corrosive or unstable liquid fuels and oxidizers.

(*b*) Operational requirements for increased and improved logistic support in the afloat and ashore materials handling field for effective fleet operations have necessitated substantial funding. Storage and issue procedures and methods have remained relatively the same during the past years and must be more completely mechanized to keep pace with technological progress.

Budget activity No. 8—Bureau of Naval Personnel—Comparative new obligational authority by budget project

No.	Project	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Difference, increase(+) or decrease (−) fiscal year 1960 compared with fiscal year 1959
8A	Military sciences	$672,500	$764,000	$800,000	+$36,000
8B	Aircraft and related equipment				
8C	Missiles and related equipment				
8D	Ships and small craft and related equipment				
8E	Ordnance, combat vehicles and related equipment				
8F	Other equipment				
	Total comparative new obligational authority	672,500	764,000	800,000	+36,000
	Net adjustment for comparative transfers				
	Total new obligational authority in budget document	672,500	764,000	800,000	+36,000
	Add: Comparative transfer of obligations from other accounts				
	Less: Obligations to be incurred in subsequent years	43,819	20,819	20,819	
	Obligations against current-year funds	628,681	743,181	779,181	+36,000
	Add: Obligations against prior-year authority	53,025	43,819	20,819	−23,000
	Proposed transfer of obligations against prior-year authority from other accounts				
	Total direct obligations in budget document	681,706	787,000	800,000	+13,000

Budget Activity No. 8—Bureau of Naval Personnel

INTRODUCTION

The primary mission of the research program administered by the Chief of Naval Personnel is to conduct applied psychological and training research which will enable the Navy to produce officers and men qualified to man all ships and squadrons. This program is quite broad in scope and contributes to all aspects of naval personnel administration including officer and enlisted procurement, selection, distribution, assignment, training, and promotion.

REPORT ON PROGRAM ADMINISTRATION

In fiscal year 1959, highest priority is being given to research in the personnel aspects and implications of new weapons, systems, and equipment. This is strictly applied research. Basic research is the responsibility of the Office of Naval Research. Requests for research originate in the Training, Plans, Policy, Requirements, Promotion, Distribution Divisions and other operating divisions of the Bureau of Naval Personnel. The program is one designed to meet immediate needs, to help solve urgent problems, and to serve as a base for effective personnel planning.

MAJOR PROGRAM AND FUNDING CONSIDERATIONS

The fiscal year 1960 personnel research program will be directed towards solving such problems of long standing as reenlistments, retention of officers, stability of personnel, training, specialization versus generalization, determination of precise qualitative and quantitative manpower needs, optimum allocation of skilled and high aptitude personnel, organization, and officer and enlisted career structure.

The funds requested for fiscal year 1960 are required to provide for the necessary expansion of personnel research needed to meet the increased demands created by new materiel developments.

A major effort during fiscal year 1960 will be the development of a new training concept necessary to keep personnel abreast of the many new weapons, systems, and equipment in order to achieve a high standard of personnel readiness. The critical areas of personnel and training cannot remain static and lag behind scientific and technological developments. Qualified and trained personnel must be available to operate and maintain the modern, technical Navy.

The occupational structure of the Navy is constantly changing due to the impact of these new materiel developments. Personnel research will be conducted to determine new ratings and qualifications for personnel.

Personnel research will continue in support of nuclear propulsion; *Forrestal*-type aircraft carrier; antisubmarine warfare surveillance system; and other new weapons, systems, and equipment.

Project No. 8A—Military sciences

1958 actual	$681,706
1959 estimate	787,000
1960 estimate	800,000

PURPOSE AND SCOPE OF WORK

This project provides for the support of research into personnel administration and training problems. It supports the Chief of Naval Personnel in carrying out his assigned responsibility of naval personnel administration, including officer and enlisted procurement, selection, distribution, assignment, training, and promotion.

JUSTIFICATION OF FUNDS REQUESTED

This project provides primarily for the support of two personnel research field activities, one at Washington, D.C., and one at San Diego, Calif. These activities carry out a program of applied research through the application of professional skills and techniques in an approach to Navy personnel problem areas. This project also supports contractual work with universities and nonprofit institutions.

The funds requested will provide for 105 man-years of civilian employment and the administrative support at the field activities. There is an increase of 16 man-years over the planned employment for fiscal year 1959. The civilian professional staff, composed of psychologists, occupational analysts, educational specialists, and statisticians, is responsible for conducting applied research studies to insure that the Navy's personnel systems and procedures progress in step with the technological changes the Navy is currently and continuously undergoing. No increase is planned in the contractual services area.

Personnel research is indispensable in achieving the optimum utilization of critical manpower in these critical times. This can be achieved through the concerted effort of qualified personnel and the application of proven scientific and statistical methods.

In addition to aiding in the solution of such problems and helping naval administrators make decisions, personnel research is effective in predicting personnel actions, evaluationg policies and progress, and improving conventional practices and procedures. Progress and research go hand in hand. The revolutionary changes taking place in materiel development must be accompanied by like changes in supporting personnel systems. If personnel progress is to keep pace with technological progress, as it must, then adequate funds must be spent on personnel research.

Budget activity No. 9—Marine Corps—Comparative new obligational authority by budget project

No.	Project	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960	Difference, increase (+) or decrease (−) fiscal year 1960 compared with fiscal year 1959
9A	Military sciences	$75,000	$185,000	90,000	−95,000
9B	Aircraft and related equipment				
9C	Missiles and related equipment	3,031,780	3,891,500	2,159,000	−1,732,500
9D	Ships and small craft and related equipment				
9E	Ordnance, combat vehicles and related equipment	1,642,534	2,399,000	995,000	−1,404,000
9F	Other equipment	8,253,283	7,495,500	10,154,000	+2,658,500
	Total comparative new obligational authority	13,002,597	13,971,000	13,398,000	−573,000
	Net adjustment for comparative transfers	8,148,597	7,471,000	0	−7,471,000
	Total new obligational authority in budget document	4,854,000	6,500,000	13,398,000	+6,898,000
	Add: Comparative transfer of obligations from other accounts	8,148,597	7,471,000	0	−7,471,000
	Less: Obligations to be incurred in subsequent years	594,824	176,824	2,876,824	+2,700,000
	Obligations against current-year funds	12,407,773	13,794,176	10,521,176	−3,273,000
	Add: Obligations against prior-year authority	534,096	594,824	176,824	−418,000
	Proposed transfer of obligations against prior-year authority from other accounts	0	0	1,100,000	+1,100,000
	Total direct obligations in budget document	12,941,869	14,389,000	11,798,000	−2,591,000

Budget Activity No. 9—Marine Corps

Fiscal year 1958 actual	$13,002,597
Fiscal year 1959 estimate	13,971,000
Fiscal year 1960 estimate	13,398,000

INTRODUCTION

The purpose of the Marine Corps research, development, test, and evaluation program is to assure that the operating forces in being are provided with the modern weapons, equipment, and supplies required for modern amphibious assault capability. The program contained in this activity is one of applied research, development, test, and evaluation directed toward meeting real requirements for improved combat weapons and fire control equipment, communication equipment, detection-identification and location equipment, guided missiles and associated ground equipment for air defense and close support of landing forces, cargo handling equipment, engineer equipment and personal protective equipment. This represents a part of the Marine Corps' response to its statutory responsibilities for development of tactics, techniques and equipment for landing force in amphibious operations.

REPORT ON PROGRAM ADMINISTRATION

The Marine Corps funds for developments peculiar to the Marine Corps mission and that portion of other services developments necessary to insure accomplishment of the necessary developments to meet the requirements for amphibious operations. Although the funds for this activity are administered by the Commandant of the Marine Corps, most of these funds are transferred to the bureau or service best qualified to direct the research and development in the case of items peculiar to the Marine Corps' mission or to the agency directing the major effort in the case of items for which an amphibious ca-

pability is desired. By this procedure the Marine Corps eliminates the necessity for a large research, development, test, and evaluation organization and obtains equipment which meets the requirements of amphibious operations and is similar to and compatible with equipment of other services.

MAJOR PROGRAM AND FUNDING CONSIDERATIONS IN FISCAL YEAR 1960

This request is based on a detailed listing of research, development, test, and evaluation requirements which have been carefully screened and evaluated to eliminate all but the most urgent, while retaining a well balanced research and development program. The funds requested are primarily for the continuation of significant projects already established and projects to be initiated with fiscal year 1959 funds.

Project No. 9A—Military sciences

Fiscal year 1958 actual	$75,000
Fiscal year 1959 estimate	185,000
Fiscal year 1960 estimate	90,000

PURPOSE AND SCOPE OF WORK

This project provides for research to determine possible avenues of approach in the solution of development problems and the examination and appraisal of techniques and skills which affect the conduct of amphibious operations. Included is the development of general amphibious cargo packaging materials and components.

JUSTIFICATION OF FUNDS REQUESTED

The Marine Corps has a requirement for new methods of packaging equipment and supplies to ensure useable items being delivered to using units under conditions to be expected in amphibious operations. Particular emphasis will be on the delivery of supplies and equipment by helicopter in support of the helicopter assault.

Project No. 9C—Missiles and related equipment

Fiscal year 1958 actual	$3,031,780
Fiscal year 1959 estimate	3,891,500
Fiscal year 1960 estimate	2,159,000

PURPOSE AND SCOPE OF WORK

This project provides for the development and test of guided missiles and associated launching and control equipment for use in the air defense and close support of the landing force in amphibious operations. The funds are to be used primarily for development and testing of launching and control equipment for one air defense missile system and one close support missile system.

JUSTIFICATION OF FUNDS REQUESTED

The Marine Corps is participating with the Army in the development of a man portable low altitude air defense missile system and a close support missile system, and must provide funds to cover the amphibious aspects of the developments.

Project No. 9E—Ordnance combat vehicles and related equipment

Fiscal year 1958 actual	1,642,534
Fiscal year 1959 estimate	2,399,000
Fiscal year 1960 estimate	995,000

PURPOSE AND SCOPE OF WORK

This project provides for the development of a lightweight artillery weapon, a mechanical data computer and an amphibious support vehicle for the use of landing forces. The project also provides for the test and evaluation of amphibious vehicles by the Marine Corps.

JUSTIFICATION OF FUNDS REQUESTED

The need for a lightweight direct support artillery weapon with improved range and lethality characteristics has been increased by the requirement for a vertical assault capability in amphibious operations. The present standard direct support artillery weapon fails to meet the requirement imposed by the modern amphibious doctrine. The mechanical data computer will provide a faster and more accurate means of calculating firing data. The artillery weapon is a joint Army-Marine Corps development and the Bureau of Ordnance is developing the mechanical data computer for the Marine Corps. In an over-the-beach operation or a combination vertical assault and over-the-beach operation, speed in landing personnel and equipment is essential. An amphibious support vehicle is required to move personnel and equipment from ship to inland areas at much greater speeds than the current amphibious tracked vehicle (LVT).

Project No. 9F—Other equipment

Fiscal year 1958 actual	8,253,283
Fiscal year 1959 estimate	7,495,500
Fiscal year 1960 estimate	10,154,000

PURPOSE AND SCOPE OF WORK

This project provides for research, development, test, and evaluation on items other than those accounted for under other projects. It includes communications, detection, location, identification, engineering, and personal protective equipment.

JUSTIFICATION OF FUNDS REQUESTED

The funds requested for this project are for the continuation of research and development effort on previously initiated developments, testing and improving existing equipment and the development of equipment associated with equipment already under development. The major effort in this project is devoted to developing and testing a tactical data system, lightweight communications, detection, identificaton, and location equipment. In addition, funds are included for development and testing of personal protective equipment and engineering equipment.

Mr. MAHON. Unlike some of the missile programs and other programs which may be on schedule, or ahead of schedule, we are way behind. There has been considerable slippage.

Eventually we will have to get this bill to the House of Representatives and get it passed, so we will expedite the hearings where we reasonably can, but we do want all significant testimony with respect to the Navy budget in this area.

What is your suggested plan of procedure?

Admiral HAYWARD. We have a statement by myself on the weapons system side of the program to be followed by a statement by Admiral Bennett on basic and supporting research. That should be completed within an hour.

Then we will be available for questioning. There are only two statements, mine and that of Admiral Bennett.

Mr. MAHON. Very well, you may proceed.

STATEMENT OF ASSISTANT CHIEF OF NAVAL OPERATIONS (RESEARCH AND DEVELOPMENT)

BIOGRAPHY OF REAR ADM. JOHN T. HAYWARD, U.S. NAVY

Born in New York City on November 15, 1908, Rear Adm. John Tucker Hayward had 15 months' enlisted service before his appointment to the Naval Academy in August 1926. As a midshipman he excelled in water polo, being a member of intercollegiate championship teams for 3 years and All-American in

1930. Graduated and commissioned ensign in 1930, he subsequently advanced to the rank of rear admiral, to date from August 1, 1957.

His early service included sea duty in the U.S.S. *Richmond*, and for saving the lives of members of a swimming party at Tela, Honduras in June 1931, while attached to that cruiser, he was awarded the Silver Life Saving Medal by the U.S. Treasury Department. He was designated naval aviator on September 13, 1932, and subsequently served in carrier-based Scouting Squadron 1; Patrol Squadron 2, based on Coco Solo. C.Z.; the aviation unit of the cruiser *Philadelphia*; and as senior aviator of the cruiser *Phoenix*.

Prior to and following the outbreak of World War II he served as assistant chief engineer (for instruments) at the Naval Aircraft Factory, Philadelphia, and while so assigned had duty in 1940–41 as U.S. naval observer with the Royal Air Force. From December 1942 until March 1943 he had command of Headquarters Squadron, Fleet Air Wing 2, on the west coast. He commissioned, then commanded, Bombing Squadron 106 in 1943–44, and for outstanding service in action in the Central, South, and Southwest Pacific, was awarded the Silver Star Medal, Legion of Merit, Distinguished Flying Cross (four times, once by the Army), the Air Medal (five times). He was also awarded the Purple Heart Medal for wounds received during the bombing of Canton Island by enemy aircraft in March 1943, and is entitled to the Army Distinguished Unit Ribbon for service with the 5th Air Force.

In June 1944 he became experimental officer at the Naval Ordnance Test Station, Inyokern, Calif., where he worked on all phases of rocket development and the development of, and study of destruction caused by, the atom bomb. He received a letter of commendation from the Secretary of the Navy for extraordinary achievement in that field. From July to December 1948, he was Director of Plans and Operations for the Armed Forces, Sandia Base, Albuquerque, N. Mex., concerned with the use of atomic weapons and integration of military requirements with the Los Alamos scientific laboratory.

Command of Composite Squadron 5 from December 1948, until June 1951, was followed by a tour of duty with the Atomic Energy Commission (Military Application Division), a year at sea in command of the carrier escort vessel *Point Cruz*, and command of the Naval Ordnance Laboratory from June 1954 to January 1956. He commanded the giant aircraft carrier U.S.S. *Franklin D. Roosevelt* from February 1956, until January 1957, when he became Special Assistant to the Director, Strategic Plans Division, Office of the Chief of Naval Operations. In July 1957 he was ordered to assume the duties of Assistant Chief of Naval Operations (Research and Development).

GRADUATE WORK AND TECHNICAL BACKGROUND

1937, 1938, 1939, 1940—University of Pennsylvania, Moore School and Temple University.

a. Theoretical physics.
b. Electronics.
c. Very high frequency currents.
d. Mathematical analysis.
e. Elementary foundry work.
f. Experimental atomic physics.
g. Applied gyrodynamics.
h. Procedures in experimental physics.
i. Magnetism.

1944, 1945, 1946—California Institute of Technology. OSRD ran NOTS Inyokern technical work at this time.

a. Exterior ballistics of rockets.
b. Chemistry of explosives.
c. Chemistry of propellants (solid).
d. Aerodynamics.
e. Optics.
f. Microtime physics.
g. Interior ballistics of rockets.
h. Strength of materials.
i. Explosive casting techniques.

1947, 1948—University of New Mexico and Los Alamos.
a. Contemporary physics.
b. Physics of the atmosphere.
c. Wave mechanics.
d. Critical assemblies.
e. Uranium processes.
f. Plutonium processes.
g. Nuclear processes.
1949—Stanford.
a. Compressible and supersonic flows.
b. Theoretical chemistry.

During the period of duty at Philadelphia in 1940–41, he was in charge of all instrument development for the aeronautical organization of the Navy. This included navigational instruments and techniques for aircraft.

While at Inyokern in 1944 he worked for the California Institute of Technology as experimental officer. This included all work on the rockets developed by the OSRD and the building of the technical facilities at Inyokern. The Manhattan District work called for him to work on checking all radar fusing and its operational functioning on the weapon. The explosive casting and assembly work was also done. This work was done with Los Alamos under the direct supervision of Dr. Oppenheimer and the late Rear Adm. W. S. Parsons, U.S.N. He went to Japan at the close of hostilities for the Nagasaki and Hiroshima study. In 1946 he had charge of the first attempt to photograph a nuclear explosion (Bikini) at 800,000 frames a second to see if one could relate yield to actual expansion rate of fireball. This year found him in charge of the first Bumblebee tests at Johns Hopkins.

The passage of the Atomic Energy Act brought his transfer to New Mexico in 1947, where the construction of the Sandia Base began and personnel were actively trained for use of the atomic weapons. Here facilities were designed in conjunction with the Bureau of Ships. The CORAL SEA, MIDWAY and ROOSEVELT were the first to be so configured. He participated as a technical assistant in Sandstone where he worked on the measurement of Alpha and an attempt to measure neutrons of various energies. His work was in close collaboration with Los Alamos and specifically with Dr. Bradbury, the new director.

In 1949 he was designated to organize and train the first heavy attack squadron which was to be a wing. This tour lasted 2 years and out of the successful operation of the AJ grew the first atomic capability. The A3D concept had been chosen earlier with the decision that the AJ would be the interim solution.

In 1951 he was ordered to the Atomic Energy Commission as the head of weapon research in the Division of Military Application, where he participated in program planning for all atomic weapons laboratory work at Los Alamos and Sandia. Operation Greenhouse, Buster and Ivy were in these programs and were of considerable technical impact on our whole atomic program. The formation of the Livermore Laboratory program in 1952 was one of the responsibilities of this division. His work on this program was done in close collaboration with Dr. Ernest Lawrence and Dr. Edward Teller. His tour with the Commission lasted over 2 years.

In 1954 he became the Commander of the Naval Ordnance Laboratory at White Oak. During his tour, Dr. Bennett, the Technical Director, transferred to General Electric, and until another director was appointed Captain Hayward was responsible for both jobs. This was a period of 4 months. While there he participated in graduate programs at the University of Maryland.

His work has brought him in contact with practically all the outstanding scientific people of our country. His graduate work was done originally to further his education in physics, his favorite hobby. He is an associate fellow in the Institute of Aeronautical Sciences; a Member of the American Physical Society and the Society for the Advancement of Science.

Admiral HAYWARD. Mr. Chairman and members of the committee, I am Rear Adm. John T. Hayward, Assistant Chief of Naval Operations (Research and Development). The purpose of my statement is to highlight the requirements of the chief of naval operations in research, development, test and evaluation necessary for the Department of the Navy to be—now and in the future—the most modern

and effective force for controlling the ocean areas of the world, equipped and prepared to carry out all missions assigned. I will devote the majority of my statement to the weapon systems programed for fiscal year 1960 to fulfill the requirements of the chief of naval operations.

SCOPE OF THE PROGRAM

Our R. & D. program must be patterned to cope with vastly divergent threats in the present and future scientific and technical environment. While we must produce advanced weapon systems at a rate to ensure early and orderly fleet introduction, we cannot forget the necessity to improve the Navy's inherent capability to engage in limited or peripheral wars, or more definitely, wars of limited objectives. This program is of necessity very broad in scope. Although many of the Navy's operational requirements are similar to those of other services, there are many important aspects in the development of naval systems which are unique to the Navy. In naval aviation, for example, there are aircraft requirements similar to those of the Air Force, but complicated by the fact that these aircraft must operate from carriers in a significantly different environment with respect to space, weight, launching and recovery limitations.

Many of the missile problems of the Navy are unique, due to such factors as the necessity to launch from a rolling, pitching and moving platform, and by the necessity to produce missiles adaptable to operate from carriers in a significantly different environment with at Sea.

The Marine Corps, in its traditional role as a force in readiness, requires light and compact weapons.

In the field of underwater research, which embraces not only the fundamental sciences of hydrography and oceanography but also the numerous problems associated with underwater weapon and surveillance equipment, the Navy is the only service directly involved.

The Navy R. & D. program, then, must encompass such broad areas as offensive and defensive operations with ships, aircraft, submarines, antisubmarine warfare, air defense and amphibious operations. In planning these programs, we must assure that they are within, and responsible to, our national economy and resources.

ORGANIZATION FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Within the office of the Chief of Naval Operations, planning, direction and control responsibilities of the Chief of Naval Operations for R. & D. have been centralized in my office, with the necessary authority to assure that the program will be more responsive to future planning. This organization provides the Chief of Naval Operations with one responsible assistant concentrating on the following functions:

Planning and coordinating future development.
Coordinating requirements.
Evaluating effectiveness.
Assigning priorities.
Weighing costs.

In addition, the Chief of Naval Operations has responsible assistants in each of the major warfare areas concentrating on the more immediate needs of the fleet and fleet readiness. This organization facilitates more effective coordination and cooperation between the Chief of Naval Operations, the Commandant of the Marine Corps (who establishes requirements for the Marine Corps and who is responsible for the development, in coordination with other services, of doctrines, tactics, techniques and equipment employed by landing forces in amphibious operations), the Chief of Naval Research (who manages research and coordinates development technically for the Secretary and Chief of Naval Operations, and administers the appropriation for the Secretary), and the Bureaus who manage the projects. It has enhanced the ability of the Chief of Naval Operations to keep the program progressive and flexible.

LONG-RANGE PLANNING

Our long-range planning for R. & D. is done concurrently with other Navy long-range planning as the basis for authoritatively establishing the general outlines of the Navy of the future and the basis for making more definitive statements of requirements. This long-range planning forms the basis for preparation of the operational requirements of the Chief of Naval Operations and the Commandant of the Marine Corps, and enables the Bureaus, who are the developing agencies, to concentrate their efforts on systems which are most urgently required. Further, in response to these operational requirements, the systems planned are carefully spelled out in terms of necessity, funding and time of completion only when the following important questions have been answered satisfactorily:

Is the new system really necessary?

Is it technically feasible?

Can it be obtained in the desired time?

What is the probable total cost (including research, development, test, evaluation, production, installation and maintenance during service life)?

This planning also highlights those areas which require more basic and supporting research to capitalize on scientific breakthroughs so urgently required in maintaining the competency of our operating forces.

FISCAL YEAR 1960 R. D. T. & E. PROGRAM

The fiscal year 1960 program encompasses objectives designed to insure adequate and properly directed support of our national interests. The principal objectives of this program are:

Increased ASW effectiveness.

Improved striking force capability—including POLARIS, the application of nuclear propulsion to naval systems, improved electronic countermeasures capability, and increased effectiveness of offensive and defensive missiles and aircraft systems.

Increased air defense effectiveness, especially in long-range detection, tactical data processing and control of aircraft and missiles.

Increased amphibious capability with emphasis on dispersed landings and vertical envelopment operations.

Exploitation of space technology for improvement of the Navy's combat capabilities.

A broad and comprehensive program of basic and supporting research to provide for our future capability.

The fiscal year 1960 program has been divided into two areas: The first area includes weapon and supporting systems development, test and evaluation planned in response to the operational requirements of the Chief of Naval Operations. These are the systems that must be available for the support of other programs which depend on them, principally the shipbuilding and aircraft production programs. The second area includes the basic and supporting research, which will be discussed separately by the Chief of Naval Research. It is timely to note that the submission for fiscal year 1960 includes request for funds in the areas previously covered by the appropriation: Research and development, Navy, as well as much research, development, test and evaluation effort which has received support in previous years from procurement and maintenance appropriations. The fiscal year 1960 program represents a major effort to reflect more accurately the true funding requirements in the field of research, development, test and evaluation.

With regard to R. & D. of weapon and supporting systems, priority lists have been established by the Chief of Naval Operations within the functional areas shown on the accompanying chart. Funding information for fiscal year 1959 and submissions for fiscal year 1960 are as shown.

(The tabulation referred to is classified.)

POLARIS

POLARIS, a weapon system development, and the Pacific Missile Range, which is included in the total for basic and supporting research, are shown specifically to indicate their impact on the overall program submission. POLARIS has been subject of another presentation. We are prepared to discuss the Pacific Missile Range during this presentation. Funding for basic and supporting research is shown only for the purpose of relating it to the total submission, and will be discussed separately by the Chief of Naval Research.

Within the functional packages shown, a number of promising developments will emerge on a time scale to meet the challenge of a changing environment of naval warfare.

ANTISUBMARINE WARFARE

R. & D. in antisubmarine warfare continues to respond to high priority demands for improvements in the state of the art. The fiscal year 1960 program will provide an increased effort in the development of antisubmarine surveillance and weapon systems. In particular, it will provide for development of systems, both mobile and fixed (active and passive) for detection, localization, classification and kill of all types of enemy submarines, including quiet, deep running nuclear powered boats.

(Discussion off the record.)

GUIDED MISSILE PROGRAM

The guided missile program provides the best balance attainable between the needs of the present and those of the future in both conventional and nuclear warfare. New developments will provide missiles with increased range and altitude performance, multiple target capabilities, interchangeable high explosive and nuclear warheads, and improved homing guidance systems.

(Discussion off the record.)

ELECTRONICS PROGRAM

The electronics program will be increased significantly over fiscal year 1959 to capitalize on advanced technology in this field. The program will insure early completion of development of radars capable of operating in the face of enemy countermeasures. In addition, the Navy will continue to spread the operating frequencies of air search radars of the future so that enemy jamming problems will be further complicated. The fixed array radar development holds great promise as an all-purpose radar for future naval ships. An intensive development in this field is well started. Electronic countermeasures, and certain classified projects in the electronic field to improve air defense, will also be emphasized. Communications developments, particularly in the single sideband field, are included in the program.

(Discussion off the record.)

AIRCRAFT AND AIRCRAFT SUPPORT

In aircraft and aircraft support, the fiscal year 1960 program will provide for the continuation of or commencement of significant improvements in airborne fleet air defense, and attack systems, with particular emphasis on limited war capabilities.

(Discussion off the record.)

NUCLEAR REACTOR PROGRAM

The fiscal year 1960 nuclear reactor program will emphasize development of currently approved reactors for ship and submarine propulsion systems to insure their earliest completion, and work will be continued on improving reactors, components, and systems.

(Discussion off the record.)

MARINE CORPS

Programing for R. & D. includes U.S. Marine Corps requirements. The Marine Corps submissions reflect the total fiscal year 1960 program planned for systems peculiar to landing force operations.

(Discussion off the record.)

The R. & D. effort in training devices must be maintained at a level to support adequately the training program so vital to orderly introduction of weapons to the fleet. Funding in this area reflects a careful consideration of requirements for surface, air and undersea warfare, as well as Marine Corps training devices for fiscal year 1960.

The Navy pursues a most comprehensive program of system analysis to determine adequacy of planned programs to fulfill requirements for future developments. Prior to acceptance of a weapon or support system for development under the Navy's R. & D. program, extensive studies are conducted in the area of its application to determine the feasibility of the proposed system, and its ultimate contribution to the state-of-the-art in naval operations.

SUMMARY

The fiscal year 1960 R. & D. program is based on a careful analysis of requirements to meet the needs of the Department of the Navy. It is a balanced, integrated program which represents the most carefully planned effort, consistent with the national budget and policy, to develop, test, and evaluate our next generation of weapon and support systems. These systems, together with our program of basic and supporting research, have been planned to fulfill the Navy's objectives for fiscal year 1960. The program is predicated on the requirements of the Chief of Naval Operations and the Commandant of the Marine Corps, supplemented by the planned efforts of the Chief of Naval Research and the bureau chiefs to fulfill these requirements in their assigned fields of responsibility.

Admiral Bennett will cover part 2, the basic and supporting research side of the picture, Mr. Chairman.

Mr. MAHON. Proceed, Admiral Bennett.

STATEMENT OF CHIEF OF NAVAL RESEARCH

BIOGRAPHY OF REAR ADM. RAWSON BENNETT, U.S. NAVY, CHIEF OF NAVAL RESEARCH

Graduate U.S. Naval Academy, 1927, with B.S. degree; postgraduate instruction at Annapolis in radio (electronic) engineering 1934–36; additional postgraduate course at University of California where awarded M.S. degree in electrical engineering in 1937.

Served in various surface ships in the Pacific and Asiatic Fleets. Battle fleet communications duty 1928–30. Radio and sound officer on staff of commander, Destroyer Division 50, 1938–41. Set up technical program of the first Fleet Sound School, San Diego, 1939. Designated for engineering duty in 1941. Has had broad experience in naval research and development work in the field of electronics throughout career. Served with the Bureau of Ships as head of the Underwater Sound Design Section of the Radio Division and later as head of Electronics Design Division, 1943–46. Director of U.S. Navy Electronics Laboratory, San Diego, where he accomplished the postwar expansion of the laboratory, 1946–50. Set up and became first Director of the triservice Electronics Production Resources Agency, 1950–51. Additional tours in Bureau of Ships as head of Mine Warfare Branch and later as Assistant Chief for Electronics.

Awarded Legion of Merit for exceptionally meritorious conduct and for "proposing and organizing the first antisubmarine attack teacher, which was subsequently utilized in training antisubmarine personnel (he) also designed sonic and supersonic underwater sound apparatus so urgently required by the fleet for the destruction of Axis submarines and Japanese shipping." He is a registered professional engineer, State of California; fellow of the Institute of Radio Engineers; fellow of the Acoustical Society; and fellow of the American Association for the Advancement of Science.

Admiral BENNETT. Mr. Chairman and members of the committee, before discussing the research program, I will summarize very briefly the request for funds for this appropriation. The Navy is requesting

$971 million of new obligational authority for support of the fiscal year 1960 research, development, test, and evaluation program. Of this total, $783 million is for the research and development program formerly funded by the appropriation "Research and development, Navy", and $188 million is for certain items of a research and development nature and related minor items of test and evaluation formerly funded by the maintenance and procurement appropriations of the Navy.

Expenditures under this appropriation in fiscal year 1960 are estimated at $922 million, based on experience of prior years. This compares with actual expenditures of $724 million in fiscal year 1958 and expenditures estimated at $940 million in fiscal year 1959.

Rear Admiral Hayward has been speaking of weapons systems requirements and reporting on some of the developments. But all weapons systems are completely dependent on the state of science and the engineering arts. The part of the budget to be discussed now covers five major areas: basic research, applied research, exploratory development, supporting development, and test and evaluation. However, it is not always possible to draw precise lines between these areas.

BASIC RESEARCH

In these times the subject of basic research is of great interest. Therefore, before speaking of present basic research, it may be informative to mention one or two historic items.

Years ago a learned man wrote speculatively of splitting atoms. A man and a woman then proposed bombarding uranium to try and test the theory. They succeeded. Another man tried again and was even more successful.

Though long ago, even then a few scientists were interested in the Navy. One of them suggested a conference with the man last mentioned. As a result, a project was started at the Naval Research Laboratory.

The learned man was Rutherford. The man and woman were the Germans, Hahn and Meitner. The exploiter was Fermi. The man who called in the Navy was Pegram. The man who started the Navy project was Gunn.

The result of this theoretical chain? Ultimately, the *Nautilus* powerplant.

To move closer to the present, let us recall the project started in 1947 on polymerizing nitro compounds. Not related to the Navy? This is the basis for all solid fuel rockets of consequence, now coming to fruition in such things as POLARIS.

The Arctic did not appear to be valuable to the Navy in the early postwar years. Nevertheless oceanographic research resulted in knowledge that facilitated the construction of the DEW line. The discovery and mapping of the Barrow Sea Valley was a part of the oceanography. The data were thus there when the transpolar voyage of the *Nautilus* became possible.

It is now clear that the radiation bands, the Van Allen bands that surround the earth, are of great importance in the future of possible space travel. They are also thought to be intimately tied in with the aurora and magnetic storms. It is not so clear that Dr. Van Allen

was in a position to produce the needed instrumentation because the Navy had supported his cosmic ray investigations since January 1952. This work continues in balloon experiments under ONR-AEC sponsorship and in space probes supported by NASA.

In 1946 a study was begun on the production and use in the laboratory of high velocity, highly heated gases in shock tubes. Today this research has paid off in the solution of reentry problems in the laboratory rather than very expensively and slowly by actual missile firings.

Two major points are of interest. The first is that basic research that is vital cannot always be tied to a specific naval or military problem. The second is that it may take years for a basic investigation to pay off.

Only very rarely does an idea in theory find direct application to a Navy problem in the first instance.

(Discussion off the record.)

Mr. MAHON. Proceed.

Admiral BENNETT. A few other basic research ideas may be of interest. Some theoretical work in the analyses of structures has been applied to the stiffening frames of submarines. Reductions in weight up to 100 tons and increased useful volume have proved practicable by model tests. ONR and the Bureau of Ships joined in this work.

Electrical equipment can be accidentally flooded at sea due to collision as well as battle damage. A new combination cleanser solvent mixture has been developed by the Naval Research Laboratory to remove the water and even fuel oil from equipment.

Radio astronomy is of ever-growing importance as a source for information on which to base radio navigation devices. A unique radio telescope is now in operation by the California Institute of Technology at Bishop, Calif., of two 90-foot dishes working together for very precise mapping of extra-terrestrial signals.

Scientists can practice economy too. The ARCOS and ARCON research rockets developed by and for the Naval Research Laboratory are simple, inexpensive devices, less than 15 feet long, yet they can carry limited instrument loads up to 80–100 miles.

In the area of medicine, completely cleansed bony material, sometimes called anorganic bone, appears very successful in animal experiments in bone grafting, so much so that the material has been incorporated into the animal's system.

Research in allergens tested in over 100 patients promises eventual protection against hay fever for a whole year with one injection.

A sample test has been made of the theory that when burned there are toxic substances thrown off by the skin which the body treats with antitoxins developed in the body. In theory then blood from those who have recovered from burns should help burn victims. Six of seven children burned in the Chicago school fire showed radical improvement following the use of such blood.

I should interject here that the seventh one proved to be negative Rh, and there was not enough blood to make a true test of the seventh one. A first step on the possible proof of the theory was thus accomplished.

The treatment of cancers with the linear accelerator, constructed for theoretical physics continues at Stanford with good success.

The complex problems of oceanography have recently been studied by the Navy and by a national committee of the National Academy of Sciences/National Research Council. A 10-year program has been laid out in the national interest. The Navy has taken the lead in forming an interdepartmental panel so that there will be one national program. However, the interests are so varied from commercial fisheries problems to defense requirements that the various agencies are expected to support their own portions of the whole national program.

Oceanography is a broad area with many factors affecting our problems, the temperature structure of the water, the depth of water, the ocean bottom, the ocean currents, and the waves at the surface. Some of these items affect the transmission of sound. Currents, including the counter-currents below major ocean currents (discovered in 1958) affect the movement of ships. Research on surface wave condition prediction can lead to better routing of ships, even merchant ships.

There are problems in flight at high temperature and high altitude. These are under investigation in various facilities, shock tubes, low density wind tunnels, plasma jets, ion beams, etc. The properties of gases at high temperatures and low density and the behavior of metals at extreme temperatures and pressures apply to heat transfer and aerodynamic characteristics in upper atmosphere, high-speed flight, including those of reentry. Some of the problems cover ablation of surfaces through melting and erosion as well as those of stress and creep.

There is a picture, Mr. Chairman, of a typical ablation or melting away of a nose cone taken of an experiment in a laboratory shock tube.

Mr. FORD. The nose cone is where, on the left?

Admiral BENNETT. Yes, sir. It is being ablated, as the scientists say. It is actually liquefying and flying off.

A wide variety of problems in high altitude physics is planned, using SKYHOOK balloons. Although all the experiments are conducted with an eye to ultimately making similar measurements from satellites, the stability and recoverability of balloon experiments will exceed that of satellites for some time to come. A spectacular experiment from balloons was the photography of the sun's disk and limb from a 12-inch telescope at over 80,000 feet.

That picture which looks a little like a bowl of oatmeal is one of the most exciting pictures the astronomers and propagation people have ever had. That is a picture of the actual surface of the sun taken at over 80,000 feet, which is beyond most of the atmosphere. The light spots are, you might say, tall clouds of boiling, burning vapor, and the darker spots are slightly cooler. By studying such pictures they hope better to understand the effect of the sun on magnetic storms and radio wave propagation.

Mr. SHEPPARD. You have a series of white spots. What do they indicate?

Admiral BENNETT. I am not sure I know what they are, sir. I am not enough an expert in this field. These pictures evade the effects of the atmosphere and give us new knowledge of the effects of the sun on weather, communications, etc. Experiments of this nature will continue with the sun and eventually planets and stars.

Solid state physics continues in basic and applied research. Studies of intermetallic compounds previously accomplished, such as indium antimonide, magnesium plumbide (lead) and gallium arsenide, incidentally produced a knowledge of the semiconductive nature of such compounds. Commercial application has already resulted in the transistor art.

The weather is always of interest, but unlike some others we are trying to do something about it. Project HUGO is a rocket observation system which photographs large weather areas with a sophisticated instrumented photographic head lifted aloft on a composite of inexpensive rockets. The pictures taken should contribute to studies of our major weather phenomena.

The HUGO rocket in this case was fired from point X. The area surveyed is shown on the sector.

The next picture I think some of you have seen in the paper. This is a composite of the frames. This is a weather front which roughly extends from New York to Hatteras, taken from a rocket.

Much more could be said about the various fascinating areas of basic research, but there are other things meriting attention.

APPLIED RESEARCH

Applied research constitutes a sizable effort on the major technical bureaus, Aeronautics, Ships, and Ordnance, as well as in some of the work of ONR.

In ONR one example might be metallurgy where much work is going on in high strength, heat and radiation resistant alloys. Columbium alloys with oxidation resistance usable up to 1000° C. which can be fabricated with common methods are an example.

In aerodynamics, in hydrodynamics, and in hydromechanics considerable is in progress. For instance, work is going forward in supercavitating and ventilated propellers and in means for reducing ship generated self-noise. Unusual hull forms are of interest because some of them promise to improve speed, with lowered resistance and reasonable horsepower.

Another area is data handling. In prospect is a transistorized computer, 100 times faster than the present best and tailored more to the men who must use it. The man-machine relationship offers pressing problems in analysis because there is little use in producing a superb complex weapon or equipment whose handling is beyond the capability of the men who man it.

In the field of analysis area and weapons systems studies will be prosecuted. The Navy's attitude on analyses is very simple. Do no studies for studies sake. But if a careful analysis promises savings in money or manpower or time in the long run, then it is worthwhile.

All four agencies mentioned play roles in materials and component developments. It is frequently difficult to classify such work even though it is of supreme importance. The next generation of ships, missiles and other equipment will be badly handicapped or rendered impossible of accomplishment without such efforts. The number of such items in the proposed budget is too numerous to allow too many specifics at this time.

The technical and other bureaus have been mentioned in various earlier remarks. In addition it should be recalled that the bureaus

have a great deal of work in supporting development and various other projects too numerous to mention in detail. Some examples might be cited.

The Bureau of Aeronautics supports naval aviation including air missilery. To insure the future considerable must be done in the fields of fuels, propulsion, aerodynamics, materials, structures, personnel, equipment, catapults and arresting gear. In avionics emphasis is placed on airborne antisubmarine warfare, countermeasures, and detection, tracking and fire-control systems.

The Bureau of Ordnance continues to improve weaponry. You have previously heard about various missile systems. Fire-control techniques need continual improvement as the speeds of warfare increase. Weapons mechanisms and components, solid propellants, and explosive phenomena, as well as materials, continue in work. A high priority goes with weapons counter-countermeasures efforts.

For the Bureau of Ships, the program continues to emphasize antisubmarine warfare and all its related fields.

Improved techniques and materials are being developed for use in detection, location, identification, and tracking of submarines. These improvements will lead to better sonar transducers and receivers, better shore direction finding and position-fixing systems, and better communications and navigation systems. A major effort is under way to develop effective antisubmarine submarines capable of operating with reduced self-noise at increased speed and with increased capability of locating and destroying enemy submarines.

The rapidly changing technology associated with solid state physics and computing machines is causing rapid changes in electronics systems. More complex equipment with large increases in numbers of components requires higher reliability in each component. Increased emphasis is being placed on the development of high temperature parts and tubes, and on improved equipment for communication data handling and electronic countermeasures. New tasks to implement such work include solid state MASER development, high temperature duplexers, semiconductor parametric amplifiers, and a Bitermitron (special double ended Klystron tube) jamming system in the Bureau of Ships.

The funds included for the Marine Corps will give particular emphasis to improve equipment for the vertical envelopment capability while continuing improvement of over-the-beach operations. Emphasis is placed on exploiting speed and effectiveness, with mobility and combat power. This means emphasis on light weight combined with ruggedness and reliability. When possible the Marine Corps joins in Army projects and vice versa. For example, the Marines participate in the Army HAWK and LACROSSE systems.

In the Bureau of Naval Personnel area efforts continue to improve personnel management and the better matching of personnel to the machine complex that is the Navy.

Yards and Docks contributes to the readiness of the amphibious and Seabee forces. In the construction area, improvements are sought in the design, construction and maintenance of shore facilities as well as efforts to increase the capability of such structures to withstand the shocks of enemy attack.

The increasing problems of health, action and reaction in flight, and in submarines, as well as under radiation hazards, highlight the program of the Bureau of Medicine and Surgery. Projects range from uses of isotopes, and treatment of radiation injury with bone marrow to the extremes of physical forces in high performance aircraft.

The Bureau of Supplies and Accounts continues efforts to improve distribution, inventory management and materials handling. In the last area, problems at sea are uppermost. Work continues on clothing and textiles for the special problems of the naval environment.

Under test and evaluation are to be found the engineering test models, pilot runs, and service test items. These include the proof of projection equipments for inspection since the procurement budget is essentially restricted to production for end use and/or inventory. In connection with weapons systems you have had some information as to when various items would be in test and evaluation. Additional information is at hand in case the committee should care to pursue some particular detail.

In conclusion, it should be emphasized that there is one coordinated Navy program even though the work assignments are dispersed in the various bureaus. Perfection is never achieved in any human endeavor. However, the fiscal year 1960 program has been anaylzed and coordinated better than that of any previous year.

(Discussion off the record.)

ORGANIZATION OF SPACE PROGRAM

Mr. MAHON. Gentlemen, your presentation has been exceptionally interesting. You always make good witnesses.

We are in the legislative business here on Capitol Hill, and we do not have the powers of administration. We can give you and others the money, but someone else has to utilize the money and see that the programs are carried out.

This morning Mr. Flood, a member of this committee, and later Mr. Crosby, the clerk of the committee, have called to my attention your testimony, Admiral Hayward, before the Symington committee, a subcommittee of the Senate.

Admiral HAYWARD. Yes, sir.

Mr. MAHON. There is a story from the New York Times of Thursday, April 16, entitled "Space Aims Held Hazy by Admiral." I do not think it would be bad to read a little of this in the record. Before I do so, I think I might say that I have read other statements from you, Admiral Hayward, expressing concern over the administrative setup with respect to space programs. Now I shall read:

Vice Adm. John T. Hayward, Chief of Naval Research and Development, told Congress today the national space program was in danger of becoming bogged down in organizational confusion. Admiral Hayward complained that the multitude of committees, agencies, and panels that have been created to coordinate and direct space activities had resulted in difficulties and delays in getting decisions. There is also a lack of clear-cut authority, he said, over the space program.

Continuing:

Admiral Hayward, who was recently promoted to three-star rank, presented his criticism in testimony before a Senate space subcommittee which is investigating possible duplication in the present space effort. Subcommittee members

were obviously impressed by the critical appraisal, which stood out in sharp contrast to the previous testimony by civilian and military officials commending the present space organization. Senator Stuart Symington, of Missouri, the subcommittee chairman, termed the testimony very disturbing.

I do not read this clipping merely to put something in the record, but in order to give you the basis of my concern as to whether or not the funds which we are asked to provide for space programs are going to be used efficiently and expeditiously or whether the present system is such that delay and indecision of one kind or another may prevent these dollars buying for us what we want them to buy.

Will you comment on this, sir?

Admiral HAYWARD. Yes, sir. The statement I made over there, and I wanted to make it quite plain, was that space is a place and not a program, Mr. Chairman, and that research and development is done for a lot of things and also applies to space. It went back to my testimony last year when they converted the NACA to NASA. The NACA was one of the best Government research programs in the business.

Mr. MAHON. Will you please spell out for the record the full titles of these agencies which you have mentioned?

Admiral HAYWARD. NACA is the National Advisory Committee for Aeronautics. They did an outstanding job. There is not an airplane that flies today which does not have some of their work on it. Our R. & D. program was complementary to the NACA. When the Congress passed the legislation and made NASA an operating agency, this is when we got into difficulty.

In the old setup the Air Force or the Navy, for instance, went ahead and bought the X–15 according to the NACA recommendations.

NACA was primarily in the research and development business. It never procured or operated large installations, and we lived very well with NACA. I was on the Supersonics Committee, and the Air Force officers knew their program very well.

When they made the setup as it exists now, we got out of the business entirely. We are not as close to them as we were previously, and I feel very strongly that under the circumstances some of the confusion which has existed has been from the numerous organizational changes and that we have been delayed somewhat. I recommended in my testimony that we consider some changes so that NASA can continue as an R. & D. outfit and that the military would operate vehicles the same way we are now operating the X–15 or anything else. If this had existed before, NASA could have gone to fly their machine or space vehicle at their own base rather than at Edwards, for instance, in the case of the X–15.

They could build their own satellite range at Wallops Island, for instance, and get into the operating business completely, and I think this is wrong. I was asked to give under oath what I thought was wrong, and I gave it.

However, I recommend the testimony rather than the article in the New York Times.

Mr. MAHON. Well, if the news story——

Admiral HAYWARD. It is essentially correct, Mr. Chairman. The testimony is in more detail as to what I recommended.

Mr. MAHON. Well, of course, this is not a legislative committee, but I thought perhaps we should take note of your view here.

Admiral HAYWARD. I did recommend that we shouldn't change the organization again this year; let us try and work with the people we have now. We are beginning to settle down. It is people that make organizations and not organizations people, and I am for getting the business going. I am sure the way it actually runs now is not covered on the organizational chart.

Mr. MAHON. You cannot speak for other people in the Navy, probably, nor for the other services.

Admiral HAYWARD. No, sir.

Mr. MAHON. What is the general view, insofar as you know it, of the people at the Pentagon with respect to this matter?

Admiral HAYWARD. Well, I have not won any popularity contest with my testimony, Mr. Chairman.

Mr. FORD. Will the chairman yield?

Mr. MAHON. Yes.

Mr. FORD. Do I gather, Admiral Hayward, that you feel the change brought about by the legislation is the major contributing factor in the problems you mentioned?

Admiral HAYWARD. A portion of it; yes. I am sure Congress gave great thought and deliberation to this problem when they passed the law. However, the Military Liaison Committee, the Civilian Military Liaison Committee, has no authority. It cannot do anything. This is in sharp contrast to the Military Liaison Committee in the Atomic Energy Commission.

Mr. FORD. As I recall, the Military Liaison Committee was not a part of the bill as submitted by the President. That was a creature of the Congress?

Admiral HAYWARD. Yes, sir. I was, I guess, partially responsible. Mr. McCormack in the select committee asked me how I would change the law if I had my way to make the Agency responsive to the military. I went back to Public Law 585 and took out the pertinent paragraphs in the Atomic Energy Act and incorporated them. The way it finally wound up is the way it is now.

Mr. FORD. I would like to ask you about another aspect of this same problem. Your R. & D. program requires no annual authorization; does it?

Admiral HAYWARD. No, sir.

Mr. FORD. Your Navy R. & D. program?

Admiral HAYWARD. No.

Mr. FORD. It requires no annual authorization such as the military construction authorization bill?

Admiral HAYWARD. No, sir.

Mr. FORD. In the original version of the space legislation there was no requirement for an annual authorization of the Space Administration's R. & D. program?

Admiral HAYWARD. No, sir.

Mr. FORD. In other words, there was originally contemplated in the law as it was passed in July that there was a general continuing authorization for R. & D. work for NASA? That was all the President recommended and that is what we put in the law, with two specific exceptions.

As you know, now, as a result of the legislative rider on a subsequent appropriation bill NASA has to get an annual authorization for every bit of its R. & D.

Does that make sense to you?

Admiral HAYWARD. No, sir; it does not make sense.

Mr. FORD. A similar procedure for Navy R. & D. would really hamstring you; would it not?

Admiral HAYWARD. Yes, sir; it does not make sense, and it worries us because I am afraid that the aeronautical side of that Agency will be swept under the rug by the space business and they still have a tremendous responsibility in the aeronautical research and development field. The manned airplane is going to be with us a long time and we need their work on it. So, it cannot do anything but hamstring them.

Mr. FORD. Does not the requirement of an actual legislative authorizing law each year complicate and duplicate the Space Agency's requests for progress and the acceleration of progress in this space business?

Admiral HAYWARD. It certainly does, Mr. Ford.

Mr. FORD. It did not make sense to me last year within 30 days after we passed the law giving a continuing R. & D. authorization and then to pass on an appropriation bill a legislative rider that requires them to make four justifications each year for their R. & D. program.

RELIABILITY OF NEW WEAPONS

Mr. MAHON. Well, these matters concern me very much. You gentlemen have certainly been in the research and development field for quite some time and you know something about the stages through which things must pass before they can be accepted as reliable.

It is being said that the airplane has been useful for 40 or 50 years and that it has gone through a long series of developmental stages and that in the beginning it was a very ineffective sort of machine.

Admiral Bennett, based upon your experience in the field of research and development, do you think as civilians we in Congress, and the people generally, should have the confidence to believe that these space weapons intercontinental ballistic missiles and weapons of that type—will be reasonably reliable and efficient in the relatively early stages, say, for the next 3 or 4 or 5 or 10 years?

Admiral BENNETT. Well, Mr. Chairman, I think I can put the question this way, if I understand it correctly: It would be something like this: Within the immediate future—within the next few years—will ballistic missiles and space vehicle type operations and equipment, if you like, be reliable?

Mr. MAHON. Yes.

Admiral BENNETT. This is almost entirely a question of the number of tries that you make a question of mathematics. I might mention the VANGUARD situation with which most of the committee is familiar. You will recall that when we were authorized to fire seven test vehicles and six full-scale satellite vehicles, then I was asked the question "Well, how many of these would become satellites?"

I think, if you consult the record, I said many times that we hoped that one would. The mathematics of probability enters this. Every one of these complex equipments, whether radars or missiles, goes through a period of testing and in the case of missiles particularly, you have to make a certain number of tries, depending on how many parts there are in the things before you get any assurance of reliability.

I believe some of our older missile programs and the simpler ones like SIDEWINDER—and I am using the figure very loosely—might have a ——— reliability.

In the case of the VANGUARD and the six full shots, one did orbit. This was in the cards right at the beginning, and another may orbit.

I think if the committee were to go into the full records of the big missiles it would find that even in REDSTONE, which is the oldest one, it is even today not ——— percent reliable, but it is getting close.

The earlier you are on these test curves, the less chance of reliability you have. I do not remember which big missile it was now, but I believe 8 or 9 of the first 10 tries on one of our big missiles was essentially a complete failure. If you will allow time and the numbers which means money, of course, to run through a reasonable program to prove out the reliability of these vehicles, and it must be done—we cannot evade it—then I think the answer to your question is that, within a reasonable period of time, we would have reliability.

Mr. MAHON. Will we have much reliability in any of the long-range ballistic missile programs by 1965?

Admiral BENNETT. This would be a guess, sir, but I would think we might very well have as much reliability as we have with manned aircraft. Remember that manned aircraft do not always fly either, sir.

Mr. MAHON. You mean in the earlier original versions?

Admiral BENNETT. Even when in production and full operation with some of them. Any complex system is very difficult to postulate as being 100 percent reliable.

Mr. MAHON. We have had in making automobiles and making airplanes a tremendous amount of experience, but we have had very little experience in making missiles and that is what worries me.

Admiral BENNETT. We have a similar situation to the one I am describing, Mr. Chairman, in the automobile business. This is what we can call a lemon. If you get stuck with a lemon from the production line, there has been a tremendous failure of reliability in an industry which has produced close to billions, I guess, of automobiles. There are still a few which are not 100 percent reliable.

Mr. MAHON. Do you think that during the period, say, 1970, we might have a sufficiently reliable vehicle to trust a very considerable portion of our defense to missiles?

Admiral BENNETT. Off the record.

(Discussion off the record.)

Mr. MAHON. Admiral Hayward, would you have any contrary or supplementary views?

Admiral HAYWARD. I would say that when you say "reliability" you have to take into consideration "what is the situation when you press the button?" I can look at the overall challenge that really faces the country, Mr. Chairman, this is going to be only one of your systems. You will never really go down and have one of them. A missile is not going to take the place of the airplane and you are not going to go just one way. It is too easy to defeat it. So I think in this time period you will be able to give a great portion of the deterrent load to the ballistic missiles.

Admiral BENNETT. Exactly.

Admiral HAYWARD. And, essentially, it will be a reliable system.

Mr. FLOOD. Reliability at least to me is not pushing the button. Reliability is at the point of impact at the target.

Admiral HAYWARD. This is what I mean. It depends on how you define reliability.

Mr. FLOOD. Very much.

Admiral HAYWARD. If it is a completed mission by 1965, why, I would———

Mr. FLOOD. We are not interested in fireworks. We are interested in the targets and reliability at the point of impact.

Admiral HAYWARD. Well, there are a lot of intangibles in that time as to whether you have—you never will have 100 percent reliability of system under those circumstances, of course, and we realize that. If it is 50 percent reliable it will be good.

Mr. BOYLE. What about 20 percent by 1965?

Admiral HAYWARD. Oh, certainly, it should be that high. That would be a minimum, I would think. It would be closer to———.

Mr. ANDREWS. In 1965?

Admiral HAYWARD. Yes; and that is pretty good whether it is a manned airplane system or any system to put the bomb on the target in which ——— of the aircraft that leave actually put the bomb on the target. This is a very high percentage.

Mr. FLOOD. We were given the figure of ——— in that time period for ICBM in any category.

Admiral HAYWARD. ——— on the target will be a good, reliable system.

Mr. FLOOD. Of course, if your target is Washington and you missed the target in Washington with a thermonuclear warhead and it drops on Baltimore somebody gets hurt in Baltimore, reliability is a rather elastic term; is it not?

Admiral HAYWARD. Yes, sir; it is.

COST OF TALOS

Mr. MAHON. The Navy is continuing development of the TALOS missile which is said to be comparable to the Army's NIKE HERCULES missile. We have had statements showing costs to date and cost projected through the 1960 budget for various other antiaircraft missile systems.

Would you furnish such a projection for the TALOS system for comparable purposes?

Admiral HAYWARD. Yes, sir; we can furnish that.

(The information requested was submitted to the Committee.)

Mr. MAHON. What can you give us, off the cuff, now as to the cost through 1960?

Admiral HAYWARD. Off the record.

Mr. MAHON. Is the Navy really sold on this TALOS missile?

Admiral HAYWARD. Yes, sir.

Mr. MAHON. I might ask you, at this time, if you will make the record a little clearer on this point when you receive it.

Admiral HAYWARD. Yes, sir.

(The information referred to was submitted to the Committee.)

Mr. MAHON. Have you ever made a study of the comparative unit cost of the TALOS missile as compared with the NIKE HERCULES missile and, if so, what are the relative costs?

Admiral HAYWARD. Well, I have not made a study in that respect. I have studied what the accomplishments were, but I can get those figures. The difference in the NIKE system and ours from the standpoint of cost is the environment and how it works. It would be impossible for us to put the NIKE HERCULES system aboard ship, for instance. It is an entirely different type of system. The cost comparisons we could furnish for the record, but I do not know them offhand.

Mr. MAHON. I do not have in mind the substitution of missiles, but rather the general cost element.

Admiral HAYWARD. I can get those figures for you. I do not have them now.

Mr. MAHON. Some of these systems cost less. The BOMARC system——

Admiral HAYWARD. I will furnish those for the record, Mr. Chairman. I do not have them.

(A classified statement was furnished.)

Mr. MAHON. Of course, the overall requirement for the NIKE program might be very much greater indeed and would be very much greater indeed. So, a comparison might be grossly misleading unless you make the point clear because the NIKE systems are much more——

Admiral HAYWARD. It is much more extensive——

Mr. MAHON. Much more expensive——

Admiral HAYWARD. And many more numbers involved in it.

NUCLEAR REACTORS FOR SHIP PROPULSION

Mr. SHEPPARD. Admiral Hayward, with respect to page 16 of your general statement in the second paragraph from the top, I quote:

(The material quoted was classified.)

Interpreting that statement literally, that means that you will have those in an operational category as of what time?

Admiral HAYWARD. Off the record.

(Discussion off the record.)

Mr. SHEPPARD. Pardon me. Am I to assume from your statement that the testing you are doing at ARCO is on a comparable basis for proving out your reactors or eliminating your bugs, as it were, that you utilized on the *Nautilus* program?

Admiral HAYWARD. Yes, sir.

Mr. SHEPPARD. But intensified, comparatively speaking, to what the *Nautilus* was?

Admiral HAYWARD. Yes, sir.

Mr. SHEPPARD. So, in the final analysis when this particular reactor comes out of ARCO there should not be very much question left in the mind as to its operational ability?

Admiral HAYWARD. Oh, no, sir; there will be no question.

Mr. SHEPPARD. And insofar as the hypothetical assumption on my part that you are involved in any difficulty in providing reactors for ship propulsion purposes, that is a mathematical assumption at this time because of the fact the project is already in existence; is that correct?

Admiral HAYWARD. That is correct, Mr. Sheppard.

NAVY BUDGET PRESENTATION

Mr. SHEPPARD. With further reference to the statement that you have presented and the statement that Admiral Bennett presented for the committee, your presentations—and I am referring to the Navy in general and its method of preparing and presenting its statement having to do with your overall expenditures—are quite comparable with those statements you have made in the past; are they not?

Admiral BENNETT. Yes, sir.

Mr. SHEPPARD. I have before me a breakdown which carries 96 pages of justifications, including the green sheets, line items and detail for the expenditure funds requested?

Admiral BENNETT. Yes, sir.

Mr. SHEPPARD. And that is prepared upon the same premise that you have heretofore prepared your presentation statements?

Admiral BENNETT. Yes, sir.

Mr. SHEPPARD. And in detail to the same general degree; is it not?

Admiral BENNETT. Yes, sir.

Mr. SHEPPARD. And if this committee is desirous of having more detailed presentations and justifications for the expenditures requested within this budget, all we have got to do is refer to the line items and direct our interrogation accordingly?

Admiral BENNETT. Yes, sir.

Mr. SHEPPARD. The information is available here upon the same premise as we have had in the past tense?

Admiral BENNETT. Yes, sir.

Mr. SHEPPARD. I have no further questions.

CANCER TREATMENTS

Mr. ANDREWS. Admiral Bennett, I wish you would tell us a little more about the treatment of cancer at Stanford University.

You stated that you were having good success with that program. Will you amplify that a little as to what types of cancer you are treating?

Admiral BENNETT. I believe we have a medical officer here, sir, and perhaps after I make a general statement the doctor can be a little more enlightening. I am not sure what kind of cancers are treated. This is high-frequency X-ray and cobalt is the source of the high energy nuclear particles, if you like, which can be directed upon a patient to eliminate the cancer.

Mr. ANDREWS. Doctor, would you elaborate a little further for us?

Admiral GALLOWAY. Sir, I do not know the exact category of patients that are being treated at the university. I am sure they are the deep-seated type of cancer that are most difficult to treat by the ordinary type of radiation and radium, but I do not know the exact category. Certainly, they are not the superficial type that are easily handled. The treatment of cancer today is improving rapidly, but the major improvement is in the area of early diagnosis and accurate diagnosis rather than any new breakthrough in the field of direct therapy.

Does that answer your question?

Mr. ANDREWS. Yes, sir.

TALOS MISSILE

Admiral Bennett, what Navy weapon is comparable to the Air Force BOMARC?

Admiral HAYWARD. Well, our air defense weapon is the TALOS primarily.

Mr. ANDREWS. How does it compare with the BOMARC in range, payload and cost?

Admiral HAYWARD. Off the record.

Mr. ANDREWS. What is the range of your TALOS?

Admiral HAYWARD. Off the record.

Mr. ANDREWS. Is that launched from a ship?

Admiral HAYWARD. Yes, sir; that is launched from a ship.

Mr. ANDREWS. Can it be launched from the ground?

Admiral HAYWARD. Yes, sir. Actually this weapon was turned over to the Army for possible use in continental defense—point defense—but they decided the other way, to go to the NIKE HERCULES, and the TALOS died a natural death.

Mr. ANDREWS. Did you have this missile in production and had you given it a thorough test?

Admiral HAYWARD. No, sir; I can tell you the background of this. It is a product of the original applied physics laboratory, Johns Hopkins Bumblebee program, which produced the first ramjet flown in this country. We went through a series of tests before we came up with any ground-to-air missile.

The first ground-to-air missile that the Navy came out with was the TERRIER which was nothing but the adaptation of a supersonic test vehicle and a solid rocket. Actually, at about the same time that this program was started the BOMARC was started. It was known as the GAPA program to begin with in 1948, and it actually got into the BOMARC in about 1951 or 1952, as my memory serves me. The BOMARC, of course, is a ramjet also.

Actually, we did not go into production on any of these until we had a pretty much proven out system. That system was well proven before we went into production on it.

Mr. FORD. Will the gentleman yield?

Mr. ANDREWS. Yes.

Mr. FORD. Which one of those various versions is now operational?

Admiral HAYWARD. Off the record. Of course, the *Galveston* is our first ship with this, followed by the *Little Rock*. Of course, before we went to these conversions we had to have a system because in building a ship you have to know what you are going to have before you get in concrete.

Mr. ANDREWS. How many of those missiles can you put on a ship?

Admiral MASTERSON. ——— For each launcher and on the *Galveston* she has a single launcher which will handle ——— missiles.

Some of the launchers will handle ——— missiles on later ships. The figure will be ——— for each launcher, and if the ship has two launchers it will be ———.

Mr. ANDREWS. That is a pretty good defense for the mainland if you locate your ships off the coast; is it not?

Admiral HAYWARD. Yes, sir. It has greater application in the Navy air defense problem, where we have given the ground-to-air

missile the close-in defense which is ——— miles away. Your interceptor uses air-to-air missiles which take the defense from there on out. This is what has made us go back as I showed you on the missile carrier where we put the performance in the missile rather than in the interceptor. The interceptor goes to a tremendous size and is expensive and we do not get as much air defense per airplane on the deck per square foot of carrier deck.

Mr. ANDREWS. How reliable do you consider these missiles?

Admiral HAYWARD. Our reliability was about ——— percent on the last one, the last figures that we had on it.

Mr. ANDREWS. And the same mission which is accomplished by the BOMARC could be accomplished by this TALOS?

Admiral HAYWARD. No, sir; this is a different problem. The air defense system of the fleet is different than trying to use the BOMARC with the SAGE system. It is a different approach to it completely.

Mr. ANDREWS. Well, the mission of the BOMARC is to knock down approaching planes coming onto the American continent?

Admiral HAYWARD. Yes, sir.

Mr. ANDREWS. You can do the same thing with a TALOS either from a ship or on land?

Admiral HAYWARD. Yes, sir; you could use it on land.

Mr. ANDREWS. So, the answer to the question I asked is that this missile could accomplish the same mission designed for the BOMARC? The answer to that question is "Yes"?

Admiral HAYWARD. The answer to that is "Yes," yes, sir.

Mr. MAHON. I do not think that is clear. First you say no, and then you say yes.

Admiral HAYWARD. Well, I will say——

Mr. MAHON. You leave us confused.

Admiral HAYWARD. I will say "Yes," to Mr. Andrews' question, in other words, is this an air defense missile which can be used on the land?

Mr. MAHON. You say that this is just as good, or will be, when it is proved, as the BOMARC will be when it is perfected. Is that what you say?

Admiral HAYWARD. Was that the question?

Mr. MAHON. No; I am trying to get your views. This is not near as long range as the BOMARC missile.

Mr. ANDREWS. It lacks only ——— miles.

Admiral HAYWARD. Off the record.

(Discussion off the record.)

Mr. MAHON. Is it fair to say that in your opinion, if you were running the Department of Defense, you would just rely on the TALOS or would you have a BOMARC and a TALOS?

Admiral HAYWARD. No, sir; I do not want to get in the position of saying I would put the TALOS before the BOMARC.

Mr. MAHON. I think that is the gist of your testimony.

Mr. ANDREWS. I did not ask for that answer.

Admiral HAYWARD. I said a TALOS is an air defense weapon and when the TALOS was given to the Army and the Air Force for evaluation to see whether they could use it in their systems, they decided not to use it.

Mr. ANDREWS. The Air Force decided not to use the TALOS?

Admiral HAYWARD. The Army decided not to use it.

Mr. ANDREWS. Did the Air Force ever have a look at it?

Admiral HAYWARD. Yes, sir; the Air Force wanted to use it at their Strategic Air Command bases but the Army had the mission of the point defense. The Army canceled the TALOS as far as the point defense is concerned.

Mr. ANDREWS. And not the Air Force?

Admiral HAYWARD. No, sir.

Mr. ANDREWS. In view of all the developments, is it a fair implication from your testimony that probably by the development of one weapon only, namely, the TALOS, we can do the job which we contemplate will be done by the TALOS for the Navy and by the BOMARC for the Air Force?

Admiral HAYWARD. No, sir; I just would not want one weapon to do it. I do not want to get in the position— if that was the question I answered "Yes" to, I say "No". The BOMARC, NIKE, and HERCULES and other systems have an entirely different problem than we have on the TALOS.

Mr. ANDREWS. But if you can solve that problem with the TALOS and it is trustworthy and perhaps less expensive, why do we not go to the TALOS?

Admiral HAYWARD. Well, my only answer to that is that we gave them the problem to evaluate it and the other services, who have the mission, decided not to go to the TALOS. As a matter of fact, originally the Air Force and the Navy got together, and we were going to use the TALOS for our defense. However, the Army decided to go the other route, and the Army had the responsibility.

Mr. ANDREWS. I remember when we had a lot of controversy a few years ago about these matters.

Mr. MAHON. Off the record.

(Discussion off the record)

Mr. MAHON. That will be all for today, gentlemen, and we will meet tomorrow morning at 10 o'clock.

TUESDAY, APRIL 21, 1959.

Mr. MAHON. Gentlemen, you gave us a good overall picture of the Navy research and development program yesterday, and I must say one of the most interesting presentations we have had this year in regard to research and development.

This morning we want to get down to some detail in regard to the actual dollar requirements. I believe it would be best to go through the various projects in order to get a direct feel for what we actually are doing by way of research and development in trying to have a greater degree of capability in the area of limited war.

(Off the record.)

Mr. MAHON. Without objection, you may proceed for 30 minutes without interruption.

ANTISUBMARINE WARFARE DEVELOPMENT

Admiral HAYWARD. Under the antisubmarine warfare systems development, you see we have a total of ——— this year.

(Presentation made off the record.)

AIRCRAFT AND AIRCRAFT SUPPORT

Admiral HAYWARD. The next one is aircraft and aircraft support. We in the Navy, of course, feel very strongly that the ability to project our power across the sea rests on the aircraft carrier. It is very hard for us sometimes to understand why people question the use of this and that physics on the sea is the same as on land. One-half MV^2 is the same on the ship as it is on the land. When you try to land a modern aircraft abroad one of our *Essex* class ships, you immediately have lots of difficulty. We find that there seems to be no argument about increasing the length of our runways to 10,000, 12,000, or 14,000 feet of concrete, but when we want 750 feet of landing space on the *Forrestal* deck, people immediately start talking about supercarriers and things of this kind.

In a limited war situation, it is necessary for us to have aircraft. The decision rests on the decision in the air. As you have noticed, our potential enemy always gives his friends the best aircraft and I am sure this committee would not want to send our people out to fight in second-rate aircraft against the enemy's best.

It is of interest to note that 70 naval aviation personnel died in aircraft accidents involved in aircraft carrier operations last year. This is a tremendous loss.

(Discussion off the record.)

Mr. ANDREWS. Can it be launched from a carrier, Admiral?

Admiral HAYWARD. Yes, sir.

Mr. ANDREWS. What was that statement you made just before you got on to that plane about a nuclear-powered plane?

Admiral HAYWARD. That is the ——— in the aircraft nuclear propulsion, which I have been interested in not just from the aircraft business but from reactor technology. I can discuss the ANP program in detail if you want to, but I would rather finish this, Mr. Chairman.

Mr. MAHON. Proceed.

(Discussion off the record.)

MARINE CORPS

Admiral HAYWARD. Mr. Chairman, if it would please the committee, I would like General Shell, who is the man in charge of research and development for the Marines, to present the Marine Corps program. General Shell occupies the same position for General Pate that I occupy for Admiral Burke.

General SHELL. Mr. Chairman and gentlemen, I would like to make just a few remarks before I go into the program, if I may.

The Marine Corps activity in the Department of the Navy research, development, test, and evaluation appropriation, was briefly covered yesterday in the two statements made by Admiral Hayward and Admiral Bennett, and I would like to present the following points on Marine Corps research, development, test, and evaluation program.

Every item in the 1960 budget for the Marine Corps research, development, test, and evaluation falls within the statutory requirement of the Marine Corps for development, with the other services, of doctrines, tactics, and equipment for landing forces in amphibious operations. The purpose of our program is to assure that the operating

forces are provided with modern equipment, weapons, and supplies required for modern amphibious assault capability. The program is directed toward meeting real requirements for proved combat weapons, fire control equipment, communications equipment, detection, identification and location equipment, guided missiles, associated ground equipment for air defense and ground support of landing forces, cargo-handling equipment, and other similar types of small equipment.

The primary objective of the program is to improve the effectiveness of the landing force with particular emphasis on the vertical assault capability, and at the same time to continue to improve our over-the-beach capability.

Specifically for the Marine Corps, this increases the force-in-readiness capability to meet limited or general war.

The Commandant has the responsibility for planning, forecasting, and determining requirements for the Marine Corps and landing forces for equipment, materiel, personnel, and supporting forces.

I would like to add here that we utilize much of the capability in the development field of other services, particularly the Army, where we have a common ground in the combat zone.

The statement on the aeronautical research and development for the Marine Corps is the responsibility of the Commandant. The budgeting for this research and development is not included in the activity 9, which is shown in the folder you gentlemen have, but is included primarily under the Bureau of Aeronautics in activity 2.

Our program, if approved, will increase the ability of the Marine Corps and landing forces to execute modern amphibious operations and insure that we have an integrated air-ground task force instantly ready to support national policy.

In this program we are making significant gains in satisfying our limited war requirements and reducing the reaction time of Fleet Marine Forces engaged in combat.

However, there remains much to be done in reducing size and weight of weapons and equipment while increasing our effectiveness and our efficiency.

Gentlemen, with those remarks, I would like to relate what I have just said to our program which is shown in this particular budget.

Under "Military sciences——

Admiral BENNETT. The Marine Corps is on page 91 of the budget document.

Mr. FORD. May I ask which book we are talking about now?

Admiral BENNETT. The General was referring to the main budget folder, I believe, sir.

General SHELL. Under "Military sciences," we have $90,000 set up to take care of amphibious cargo packaging.

Admiral BENNETT. Excuse me. Page 94 is the detail, if you wish to look at it, Mr. Chairman. The first item on the page.

Mr. MAHON. And the general breakdown is on page 91.

Admiral BENNETT. Yes, sir.

General SHELL. We have a requirement for lightweight and adequate protection in unitizing our equipment and supplies as we move them ashore, and at the same time we must have materiel-handling equipment, such as pallets, slings, and lifting devices not only to move cargo from ship to shore, but also to handle it from point to

point after we get it ashore. This particular program relates the pallets, cargo nets, slings, and box-type containers so they have a uniform size in order to take advantage of maximum storage capacity.

Also we are developing expendable fuel and water containers, which have been a big problem with us ever since the last war when we had only the steel type.

We are continuing the communications study which was initiated in last year's budget, which brings us, insofar as the two budgets are concerned, to a minus $95,000.

In the field of missiles we have a requirement in air defense for a close-support weapon for the troops. This we find in the RED EYE surface-to-air missile.

The difference between last year's budget project 9c and this year's budget, which is $1.3 million, is because the RED EYE program has proceeded now to the point that we can expect to get items of equipment for test and qualification before we turn them over to the troops. The 1960 budget will finish out the development phase of this particular weapon.

Mr. FORD. Mr. Chairman, did General Shell say $1.3 million is the difference? I think the justification shows $1.7 million.

General SHELL. I am sorry. Yes, $1.3 million is in the RED EYE program only; $1.7 million is the total for this particular category.

We also have requirements for the surface-to-surface missile LACROSSE, which has been a continuing development which we share with the Army in this particular program. In this budget we have asked for $858,000, which is our contribution to that particular program.

The difference between last year's program and this year's program on the LACROSSE is an increase of $158,000.

Under ordnance combat vehicles and related equipment, we have a need for a close support artillery weapon, a picture of which was shown on the Vu Graph yesterday, this is a 115 millimeter gun rocket. We will need $500,000 to continue the program in 1960.

It is something which we have needed for a long time.

Also included are some smaller items, such as a mechanical computer for field artillery. I do not know whether you want to go into this type of information or not, Mr. Chairman.

AMPHIBIAN SUPPORT VEHICLE

One other item I think I should mention is the amphibian support vehicle on which we are going into the technical development plan with the Bureau of Ships in order to continue to improve the amphibious ship-to-shore operation which will be required under limited war conditions and will be required by the Marine Corps for a long time because we will never get to the point in the foreseeable future, we think, when there will be an all-helicopter or all-VTOL type of lift until we can get out of the heavy equipment and the requirement for tanks.

We have a good amphibian development program in being with types which are already in the hands of troops, and the improved program which is involved in the LVT–P6 and the development of this amphibian support vehicle will continue to improve our capability to move from ship to shore more rapidly than we have been able to

in the past. We feel we actually have reached the limit insofar as speed in the amphibian tractor field.

The difference in budget project 9E over last year is $1.4 million, and the bulk of that is in the close support artillery weapon.

OTHER EQUIPMENT, MARINE CORPS

Mr. SHEPPARD. When you take up the next item, "Other equipment," I want you to be rather definitive, because you have $2.6 million for "Other equipment," which is rather indefinite. So spell it out a little more definitely. Go ahead.

General SHELL. You are speaking of budget project 9F.

Mr. SHEPPARD. "Other equipment." That is the next item to be discussed, I understand.

General SHELL. Under "Other equipment," budget project 9F, we have a requirement for the Marine Corps tactical data system. The equipment actually involved in this is the tactical operations center and the tactical air control center, which is the focal point for air control and air operations in the amphibious landings. The bulk of this $2.6 million is actually in this tactical data system, because last year we had a total of $2.6 million and the equipment now has reached the stage where we are fabricating equipment for test. This year we will have a requirement for a total of $4.8 million. The difference there is $100,000 in R. & D. and $2.1 million in test and evaluation. In other words, this equipment has reached the point that we shall be testing it.

$700,000-plus is involved in a test item for a mortar locator; test items for the surveillance radar which was funded in the last year's budget; the MPS-21, which is a 200-mile air search radar which is presently being fabricated by the Sperry Gyroscope people, and will involve $2.3 million in the 1960 budget; and three types of radio—a 15-mile pack set for the troops, a man pack set for air-ground communications, and another vehicle pack set for communications up to 50 miles.

We also have another $500,000 involved in the study of electronic warfare, which is a big problem to us and a big problem to everyone else.

There are some smaller items which involve testing of fabrics and protective equipment for the individual marine, shore party equipment, and improvement in bulk fuel handling systems.

I think that covers the program, Mr. Chairman.

Mr. MAHON. Thank you.

Admiral HAYWARD. Mr. Chairman, I have covered generally the systems. General Shell has covered the Marines. Now if you wish to continue covering all of these differences, you have the books and we can address ourselves to each difference just the same as General Shell did, if you want to do this.

Mr. MAHON. We have taken an overall look at the $540 million.

Admiral HAYWARD. Yes, sir. That is for Weapon and Support system development.

Mr. MAHON. When will you refer to basic and supporting research?

Admiral HAYWARD. Admiral Bennett will start off and cover that side of it right now, Mr. Chairman.

Mr. MAHON. Proceed, Admiral.

BASIC RESEARCH INCREASES AND DECREASES

Admiral BENNETT. Perhaps the best way to do this, Mr. Chairman, is to refer to the tabular summary of the bureaus and offices on page 18 of your budget book. If you like, sir, we can refer to the differences, the increases and decreases book, in which case the breakdown within budget activities will be found on page 20 of the same book.

Mr. MAHON. You will, of course, refer to significant items which may be involved.

Admiral BENNETT. That is right.

(Off the record.)

Mr. MAHON. Proceed.

Admiral BENNETT. In project 1–A of activity 1, the increase is $1.4 million. The individual increases are small and are applied to many items, principally oceanography and sonar systems. Then remember, this is the basic research area. More intensive efforts are needed in the area of antisubmarine warfare, submarine detection, mine countermeasures, and so forth.

The decreases for the most part are not significant. They consist of changes in budget handling and the fluctuations of minor varieties in the various projects.

In 1–B, aircraft and related equipment, there is an increase of $4.5 million. The major item here is an increase of $4.9 million in aircraft instrumentation. This is, you might say, the largest part of the completion cost of the aircraft instrumentation program which has been discussed with this committee over many years and now budgeted in this one place.

The other changes relate principally to training aids of which there is a variety listed—aircraft armament training aids, pilot and crew trainers, ASW trainers, and so forth.

In the next item, Missiles and Related Equipment, there is an increase of $2.7 million. The principal items here are shipboard simulation equipment for TALOS and TARTAR. The largest item is for miscellaneous guided missile trainers, particularly shipboard type simulation.

The next is Ship and Small Craft and Related Equipment and the increase is $1 million.

This comes principally from a temporary deferment in the support of some ancillary projects. It is offset by a small increase in training devices and related equipment. In some respects we are out of new ideas in this area, so we take a reduction where it is appropriate.

Ordnance, Combat Vehicles and Related Equipment, is mostly in the area of communication training equipment in support of communication apparatus and Marine Corps vehicles and the development of an ordnance trainer.

In Other Equipment there is a decrease of $3.6 million. The principal decreases are in the area of airborne ASW, where the items are more appropriately in the Bureau of Aeronautics budget, and in the training equipment for electronic countermeasures where there is a decrease of $1 million.

That completes Activity 1.

We can now go ahead with Activity 2, if you wish.

Activity 2A is Military Sciences in the Bureau of Aeronautics. The increase is principally the two new projects for foundational research in new ideas and concepts for aircraft and missiles.

Mr. MAHON. Off the record.

(Discussion off the record.)

Admiral BENNETT. The increase is $1.8 million. There are two areas covered. They are really in the research area where we are seeking new ideas. This is basically laboratory work in exploring the possibilities for this particular area.

In Aircraft and Related Equipment we have a decrease of $3.9 million. This is primarily due to the completion of the research and development stage of an engine development program, one aircraft program, and a reduced funding level of some of the other major projects as required. These are partially offset by the initiation of two new aircraft and two new engine projects, and a transfer to this area of the budget for an aircraft handling equipment project.

There are minor increases and decreases in all of these items.

2–C is Guided Missiles and Related Equipment and the increase is $25 million. Virtually all of the increase in this area is attributable to the costs associated with the development and operation of the Pacific Missile Range. The 1960 estimate also reflects an increase for development of air-to-air and air-to-surface missiles, as has been discussed previously. These are reflected in the basic research and development program, and they are offset by decreases in other projects.

Ships and Small Craft and Related Equipment show a decrease of $1.9 million. This is principally applicable to the test and evaluation program and a major factor is a decrease in the requirement for the development of aircraft components for arresting gear and catapults. These are minor changes in associated projects for the remaining difference.

Other Equipment shows a decrease of $1.8 million. Most of this is due to a transfer, as I mentioned before, of an aircraft handling equipment project to the Aircraft and Related Equipment area.

Next is the Bureau of Ships on page 31. There is a minor increase of $134,000 in the first item, Military Sciences, which is basically due to an increase in the effort on tubes, parts, and assembly. There is a decrease in plastics, coatings, and oceanographic research.

You will remember, Mr. Chairman, a large part of the Bureau of Ships oceanographic research was last year transferred to the Office of Naval Research.

Missiles and Related Equipment show an increase of $655,000. This also is mostly attributable to the electronic tubes and parts to support the missile effort.

Ships, Small Craft, and Related Equipment shows an increase of $7.1 million. This is principally due to a change in the test and evaluation of items previously developed. There is practically no change in the research and development portion of this budget project.

Other Equipment shows an increase of $1.5 million, and is due to an acceleration of effort in developing a long-range ship radar, shore direction finding and position fixing equipment. But this increase is largely offset by shifting electronic projects to the project previously mentioned, Ships, Small Craft and Related Equipment.

Next is the Bureau of Ordnance appearing on page 46, which shows an increase of $1 million. Primarily this is increased emphasis on the

foundational research program; that is, the idea area in the Bureau of Ordnance's own laboratories.

Other increases and decreases in smaller projects account for the main difference.

Mr. MAHON. I gave my chief attention there to 4–C and E.

Admiral BENNETT. 4–C, Missiles and Related Equipment. The decreases result primarily from the decreased emphasis on POLARIS and SIDEWINDER missiles, and the various supporting research projects, partly offset by increased emphasis on other major missile systems in the regular ordnance program. The rest is in smaller projects and that accounts for the remaining difference.

There is, for example, a decrease of $10.6 million in the SIDEWINDER effort and $58 million in the POLARIS effort.

Under fire control techniques there is a decrease of $2.5 million.

Admiral HAYWARD. The POLARIS decrease is in the research and development area. The research and development is coming down in POLARIS.

Admiral BENNETT. There is a big increase in the TARTAR weapons system, a very promising system, of $10.4 million. There is an increase also in the TERRIER, $3.1 million, and an increase in TALOS of $3.5 million.

This corresponds with the increases mentioned by Admiral Hayward yesterday and today.

In Ships and Small Craft, an increase of $991,000. This is principally an increase in emphasis on under-water fire control systems.

In 4–E we have an increase of $5.5 million. This is principally in the antisubmarine warfare program and ammunition and bombs. The SUBROC weapons system, which has been mentioned several times, accounts for an increase of $10.6 million. The LITTLE LULU previously mentioned, $2.1 million.

On the other hand, ASROC has decreased $3.7 million. The ASTOR in the research and development area, $2.8 million.

The remaining differences are made up of a large number of relatively minor projects.

Other "Equipment" shows an increase of $318,000, primarily for counter-counter measures.

In "Medicine and surgery" the changes are very small and result primarily from a minor change in emphasis. The Bureau of Medicine and Surgery has a rather stable program, as you can see from the figures. This program is integrated with the Office of Naval Research program in the medical science area.

"Yards and docks" appears on page 61 and shows a decrease of $25,000. This is made up of increases and decreases in small projects. This is also quite a stable area.

In "Supplies and accounts" the decrease is $114,000. This is primarily due to the consolidation of some projects and the transition from this area of research and development study in the military planning and operations. Other changes are minor.

Personnel shows a very small budget item, an increase of $36,000. This is an effort to fit the people better to the problems of distribution, assignments to tasks, and so forth. We have already covered the Marine Corps.

That, I believe, accounts in general at least, Mr. Chairman, for the increases and decreases in the total budget.

EVALUATION OF PROGRAM

Mr. MAHON. Admiral Bennett, it is perfectly obvious that a committee such as this could not thoroughly screen and evaluate all of these basic research problems or projects in a few hours, or even in a few days.

As I see it, it is more our function to know, insofar as we can, that you are following a type of procedure which will assure a maximum return for the dollars expended and a maximum of judgment in the discrimination as between various proposals and projects.

I would say it would take wise men many days to evaluate all of these things. I realize that you have had years of experience—you and others in the Navy—so it is not like having a Johnny-come-lately. It would take him several years to undertake to evaluate this, and he would have to get a good staff and be sure he went into this thing very thoroughly.

Now, how can you explain to John Q. Citizen the basic reason why this money is needed and we can give it to you with confidence knowing that you need it?

Admiral BENNETT. Mr. Chairman, I think you can put this in two different aspects.

The first one is that you can judge the value of the Navy's basic research program by its results. Some of those results I mentioned yesterday. We could produce others. This is proof of the pudding of the first order of magnitude in our book.

The other one is you can trace the rise and fall of science and technology in the civilian economy and in the military all stemming from basic research.

I might mention here a most interesting study which we have just finished by a very competent group—and I think the committee will be delighted to peruse the report when it is printed—it will be in the hands of the printer shortly. It shows very specifically what we have gotten from scientists; what we have gotten from basic research in some significant selected areas and what can be expected from effort in this field.

This study was initiated by my office in an effort to determine scientifically how much money one should spend on basic research. I do not say that we have been able to prove how much, but we have been able to show something of the general order of magnitude.

For the rest of it, to use your own words, Mr. Chairman, in the basic research area one must depend upon competent people. I have to depend upon them. I do not have knowledge in all the areas from astronomy to zoology, which is about the breadth of the Navy's program. Under our system of selection, we receive proposals, many, many proposals from scientists all over the country and a few from abroad. These are weighed, first of all, for their scientific merit. Is it good science? Will it produce? There will always be failures in basic research and even in applied research. Will it produce some kind of significant result as science?

The second, is it potentially headed to an area where the Navy could conceivably have some interest?

The third, is the competence of the investigator to undertake the program because a good idea which is promoted by a poor operator

is never going to go anywhere. He is going to fiddle around and waste money on it.

The fourth is whether we have the money to sponsor it. Does that answer your question?

Mr. MAHON. I think that you have done a pretty good job of answering it.

Tell us a little more how these things are evaluated. We know that you do not evaluate them all personally. You are not capable of evaluating them all personally, no one is. How do we know that they are really evaluated sufficiently before you ask for the money?

Admiral BENNETT. I think that you are trying to get at the method of selecting the projects?

Mr. MAHON. In a way. I want to know if it is thoroughly screened by capable people and if enough attention and time is given it.

Admiral BENNETT. These proposals when first received go to the appropriate functional subdivision of the office where we have experienced scientists in physics and various other areas and they are examined by them for these various criteria that I have just discussed.

Mr. MAHON. Will you amplify the answer for the record?

(The amplified answer follows:)

ONR METHOD OF SELECTING RESEARCH PROPOSALS FOR SUPPORT

Virtually all basic research proposals submitted by the Office of Naval Research are unsolicited. This is a major policy of ONR. The aim is to encourage scientists to request support for work they consider important without compromising their objectives by shaping them to Navy interest. All proposals are judged by absolute standards and are not placed in competition with each other.

There are three major criteria by which proposals are measured for acceptance by ONR. First, the scientific merit of the proposal is evaluated. This is done against the background of the importance of the scientific field and the importance of the specific area within the field and to what probable degree more knowledge will be accumulated. We ask ourselves such questions as, is this good science? It is likely to produce significant new scientific knowledge? In a few cases a new scientific field that appears to have special importance to the Navy is given special consideration in order to stimulate research in that area. Examples are oceanography and radio astronomy.

Second, the relevance of the proposed research project to the Navy mission is weighed. The knowledge to be gained from the research is evaluated from the viewpoint of how it will contribute to the long-range technical development and future evolution of the Navy. We consider whether the research is in an area in which the Navy now has or could conceivably in the future have some interest.

Third, the competence of the investigator is carefully reviewed including his background, experience, and general knowledge of the field. The size of the organization to which he is attached or the type of organization, whether academic, nonprofit, or industrial, plays no part in our consideration. In fact, all scientific dealings are directly with the investigator rather than through his organization.

There is no attempt made to establish a uniform distribution pattern in the award of ONR research contracts throughout the United States. ONR seeks to support only the best research in any particular field. Since ONR receives on the average about twice as many acceptable research proposals as can be supported by our budget, our preference is determined on a highly selective basis.

ONR utilizes a variety of mechanisms in making the actual selection, using whatever means is appropriate for the scientific field involved. The same procedures, for example, would not be used for the comparatively small field of astronomy as for the broad field of chemistry.

First of all, ONR has maintained over the years a highly competent and experienced scientific staff, which is fully capable of evaluating a wide variety of proposals. In some fields, we make use of standing advisory panels of scientists who have the highest national and even international reputations in the scientific

community. The members of the panels are usually selected by the National Academy of Sciences or the appropriate national scientific society. Where appropriate, proposals are also referred to the Navy technical bureaus or laboratories for a critique.

At the same time, ONR engages in complete coordination and cooperation with the other Government research agencies, both military and civilian. Reports of proposals received as well as actions taken are exchanged on a monthly basis. This helps to avoid duplication and assures that a research proposal will be channeled to the agency which has the predominant interest in the type of research involved. In this way, a proposal that might be turned down by ONR because of lack of Navy interest might be accepted for support by another agency.

The underlying philosophy of the Navy in contributing to the support of this Nation's research effort is to provide the knowledge that will make certain a constantly advancing Navy. At the same time, we are helping to foster a healthy nationwide scientific research program, which in itself will make it more profitable that we will have radical improvements in the future Navy.

Admiral HAYWARD. I would also like to show you this [indicating] as far as our generation of equipment is concerned.

Mr. MAHON. Off the record.

(Discussion off the record.)

Admiral BENNETT. After these people have evaluated this particular proposal the question arises, Are they right? That is a question that I have to ask all the time. Now, due to the reputation of the Office and our numerous contracts with various research activities, we have a large bank of national talent on which we can draw, and for each of these particular areas we draw people, not related to the proposer in any way, to assist us in screening and studying these for the criterion, is it good science? Is it of potential value to the Navy?

Mr. MAHON. I have every confidence in the Navy research program and that it is in good hands, and it is by reason of my faith in the administration of the program that I have the confidence that I do have in it.

Admiral BENNETT. If I might make one brief observation, Mr. Chairman.

The hardest thing for people in general, and I would include this committee, to understand is that we are never 100 percent sure of what is going to happen in basic research. We know if it is good science and a good investigator, something will come out of it. Sometimes even a negative answer is of great value.

REQUIREMENT FOR ADDITIONAL ANTISUBMARINE WARFARE RESEARCH

Mr. MAHON. I believe it was told by Admiral Cooper or Admiral Weakley that you really wanted more money in antisubmarine warfare. Is that correct, Admiral Hayward?

Admiral HAYWARD. That is correct.

Mr. MAHON. About how much and for what purpose? I believe it is already in the confidential record.

Admiral HAYWARD. It is. I have the total money broken down that we needed by projects. This is in basic research and development program. The total I wanted additional was $146 million. That was all research and development, not just antisubmarine warfare. I will furnish that for the record.

Mr. MAHON. Generally, what was in the antisubmarine warfare category? Will you make a reference to the printed hearing that treats with this matter in more detail than we will get into here today? We have had rather a good hearing on this previously.

Admiral HAYWARD. We wanted a total of $100 million additional for antisubmarine warfare.

(The information follows:)

Rear Admiral Weakley testified before the committee on February 9, 1959, and stated that an additional $71,638,000 was needed to support antisubmarine warfare system research, development, test, and evaluation. A project list was inserted in the record of the committee hearings, page 219, to justify this additional request. However, to cover the entire Navy effort in antisubmarine warfare research, development, test, and evaluation including basic and supporting research and exploratory development requirements as of now a total of $100 million is required. This includes the $71,638,000 previously requested by Rear Admiral Weakley. The justification list for additional requirements for ASW R.D.T. & E., totaling $100 million follows:

(The list referred to is classified.)

Mr. FORD. Over the present figure?

Admiral HAYWARD. Yes.

Mr. FORD. What is that?

Admiral HAYWARD. The present figure of $174,692,000 is the total at the moment in the 1960 program for research and development, test and evaluation for antisubmarine warfare. We wanted $100 million more than that and the projects involved are the following, in the systems field:

(The list of projects is classified.)

In the basic and supporting research, on the component side, which has been neglected from my point of view to a great extent, we wanted the balance for those totals which roughly ran $33.9 million for ONR, $4.56 million for the Bureau of Aeronautics, $23.1 million for the Bureau of Ships, and $11.9 million for the Bureau of Ordnance.

Mr. MAHON. Was that the best judgment of research and development, test and evaluation of officials in the Navy?

Admiral HAYWARD. Yes. We have made complete analysis of this, Admiral Weakley and I, of course, work very closely.

Mr. MAHON. How far did this go in getting approval in the Navy?

Admiral HAYWARD. I have the complete history.

Mr. MAHON. Was it in the "add-on" Navy budget?

Admiral HAYWARD. Yes.

Mr. MAHON. Clarify this for the record and make any references to the other discussions we have had.

Admiral HAYWARD. I will do that, Mr. Chairman.

(The requested information follows:)

The original budget request prepared in January 1958 for antisubmarine warfare research, development, test, and evaluation in the Navy totaled $246,330,000. The basic budget submitted by the Secretary of the Navy to the Secretary of Defense contained $174,692,000 for antisubmarine warfare research, development, test, and evaluation with an additional request for $42,703,000 for ASW R.D.T. & E.

The President's budget submission now before Congress totals $174,692,000 for ASW R.D.T. & E.

ANTISUBMARINE WARFARE AS LIMITED WAR ACTIVITY

Mr. MAHON. Is antisubmarine warfare activity a limited war activity, or not?

Admiral HAYWARD. Mr. Chairman, it can very well be. For instance, there is going to come a time, and the Chinese are building a lot of submarines, when they are going to say, "If you come around here we are going to sink you." It would not involve a direct conflict

between the Soviets and ourselves. It would be a third nation again. A limited war I define as being a conflict involving a third nation and not a direct conflict with the Soviets where our troops meet them. It is limited by objectives, not by weapons. A lot of people try to limit it by weapons. To say antisubmarine warfare is not a limited war capability is not correct because we have to get the goods and supplies needed to our friends. We always have friends in this third country. One of the great advantages of the carrier-based airplane is precise delivery on military objectives; you do not want to incinerate your friends. You will not make many if you do. So we consider antisubmarine warfare most important. I am sure that the threat will become greater. The Red Chinese, I think, are the third largest submarine building nation in existence now and they are going to boost this threat to us in the future.

Mr. FLOOD. Another element of limited warfare you forget. There is no time limit on it.

Admiral HAYWARD. That is correct, Mr. Flood.

Mr. FLOOD. Most people have the idea that a limited war will be over "Thursday."

Admiral HAYWARD. Most people mistake the challenge to the United States. I have given many speeches on this. The challenge is across the board. War has a spectrum like light. The spectrum covers from the all out war to the cold war. We have concentrated most of our effort on the all out war but have had to face the other part of the spectrum 15 times since World War II. You are familiar with the names of these actions. The challenge is economic, political, and pyschological as well as military.

The whole challenge is this: It is not how many ICBM's they have versus how many we have. That is the simple side of life and that is a simple answer that a lot of people would like, but it is not that easy. It is a lot more complex.

Mr. MAHON. I generally think of antisubmarine warfare activity coming into play more probably in an all-out war than in a limited war. I realize, as I believe most people do, that it has application to limited war. We did not use antisubmarine war activity in the Korean war, as I interpret the situation, nor did we in the Lebanon situation, nor in Taiwan, but, of course, we can be capable of utilizing these techniques in the event we are called upon to do so.

Admiral BEARDSLEY. Not only that, when you put your fleet into a limited war situation, you must have surveillance all the time and know who is around you.

Mr. MAHON. I agree fully you have to be ready. You must have the antisubmarine war capability in any limited war.

Admiral BEARDSLEY. That is right.

Admiral HAYWARD. Off the record.

(Discussion off the record.)

SOVIET SUBMARINES IN HANDS OF OTHER COUNTRIES

Mr. FLOOD. Does the Navy propose its carrier task force as a class A limited war weapon?

Admiral HAYWARD. Yes.

Mr. FLOOD. You forget that the Russians have a technique of volunteers.

Admiral HAYWARD. Yes.

Mr. FLOOD. Volunteers are not restricted to infantry platoons. You can volunteer submarines to anyone.

Admiral HAYWARD. They volunteered them to Egypt.

Mr. MAHON. Three or four, I think, or have they gotten more?

Admiral HAYWARD. Seven or eight.

Admiral WEAKLEY. Nine. Eight long-range, one medium range.

Mr. MAHON. Much of this has happened in the last 12 months?

Admiral WEAKLEY. Six went immediately post-Suez, the other three went immediately post-Lebanon.

Mr. FLOOD. The Chinese actually are constructing now, and they have been for several years, assembling submarines. They have been assembling Russian coastal submarines for many years. They are now actually building them.

SUBMARINE CAPABILITIES OF OTHER COUNTRIES

Mr. MAHON. Would you give us a statement here in regard to the submarine capability of other countries? We have the Soviet Union and the United States. What about Great Britain?

Admiral HAYWARD. Great Britain has submarine capability.

Mr. MAHON. We have the Red Chinese and we have the Egyptians.

Mr. FLOOD. And France.

Admiral HAYWARD. France, Italy, and the Netherlands.

Mr. MAHON. Does Italy have submarines?

Admiral HAYWARD. And Turkey and Italy.

Mr. MAHON. Are you sure Italy is equipped with submarines?

Admiral HAYWARD. They are equipped with U.S. submarines. I do not know how many. I can furnish that for the record.

(The information is as follows:)

Italy has five submarines, two of which are United States. Turkey has eight submarines, all formerly United States.

Mr. FORD. Has Western Germany gotten into the submarine business?

Admiral HAYWARD. They are just beginning to get into it. They are pursuing the small submarine concept.

Admiral BENNETT. Within the treaty limitation, very small submarines.

DEVELOPMENT OF R. & D. BUDGET

Mr. MAHON. Were additional funds requested for the nuclear reactor program in research and development?

Admiral HAYWARD. Originally——

Mr. MAHON. The submarine program is regarded as tremendously important.

Admiral HAYWARD. Yes.

Mr. MAHON. What was the situation there?

Admiral HAYWARD. We finally got $14.761 million. We originally requested $17 million for that, as I recall. That was a $2.3 million decrease.

Mr. MAHON. What you really did, in order to meet more or less a ceiling, was to scale down certain programs in order to apply money where you most wanted to use it within the framework of an overall limitation, more or less?

Admiral HAYWARD. We started out by trying to make a true requirement submission. We actually sat down and in great detail went over all the budget and came up with what we considered our true requirements were in the basic research and development program. This totaled $773 million. This is exclusive of POLARIS and the Pacific missile range and exclusive of T. & E. transfers. This eventually wound up with the total you have before you in the basic research and development program at $522 million. That is exclusive of POLARIS and the Pacific missile range. It is also exclusive of the T. & E. transfers that took place.

EAGLE PROGRAM

Mr. MAHON. Is there a reduction in the EAGLE program? I believe that you showed us in those tabulations that there was a reduction in that area where the EAGLE program is funded. Perhaps it was not the EAGLE program that was reduced?

Admiral HAYWARD. I do not recall that, Mr. Chairman. The EAGLE is up $2 million actually.

Mr. MAHON. What budget project is that?

Admiral BENNETT. 2–C in the Bureau of Aeronautics.

Admiral HAYWARD. It is actually up $2 million from 1959 roughly.

Mr. MAHON. There are other projects lumped in with the EAGLE. Was there an overall reduction in the entire package in which EAGLE is included?

Admiral BENNETT. No. There is an increase of $25 million in the total of guided missiles and related equipment. The principal item in there was the Pacific missile range.

RED EYE MISSILE

Mr. MAHON. I misunderstood.

Now, General Shell, when you get the RED EYE completed, the research and development work, what sort of a weapon is it going to be and what will probably be the unit cost of the first several hundred?

General SHELL. Off the record.

Mr. MAHON. It sounded quite interesting. What will the approximate unit cost be? You are apparently in the latter stages of research and development.

General SHELL. We are in the latter stages of research and development, and I regret that I do not have the individual cost of an individual weapon. It is not very much. It is a relatively cheap weapon once its gets into production.

(A classified statement was submitted.)

Mr. FORD. What is its range, altitude and capability?

General SHELL. Off the record.

LOSS OF AVIATORS

Mr. MAHON. One of the controversial items in the budget this year is the additional attack carrier. We have had a lot of testimony on it and I do not want to belabor the question here.

Admiral Hayward, you made reference to the loss of aviators last year?

Admiral HAYWARD. Yes.

Mr. MAHON. What was it, the calendar year or the fiscal year?

Admiral HAYWARD. The fiscal year.

Mr. MAHON. Will you advise the committee—and I wish you would see that a copy goes to the clerk for the attention of the committee—how many of these aviators were lost as a result of landings or takeoffs on carriers.

Admiral HAYWARD. There were 28 fatalities as a result of landings and takeoff accidents.

Mr. MAHON. How many were lost as the result of landings or takeoffs on the *Essex* type and the *Forrestal* class?

Admiral HAYWARD. Roughly, it is twice on the *Essex* as compared to what it is on the *Forrestals*, comparing identical high performance aircraft in each case.

Mr. MAHON. Now, also supply the exact figures as to how many were lost on the *Essex* type and the *Forrestal* type. If there were a hundred landings and takeoffs on one class and 10,000 on another—and I am exaggerating for the purpose of making my point—your statistics would not be too meaningful. So try to give us information in respect to the approximate number of landings and takeoffs on the *Essex* class and the *Forrestal* class and the number of planes involved.

Admiral HAYWARD. We do it in this manner: We say so many accidents per 10,000 landings on each class ship. That would make it meaningful.

Mr. FLOOD. Can you do that without classifying the aircraft?

Admiral HAYWARD. Yes. As you go to the jets its gets worse and worse.

Mr. MAHON. Mr. Flood raises a good point. Would you identify the type of aircraft involved in the casualties?

Admiral HAYWARD. We can do that.

(The requested information follows:)

COMPARISON OF "FORRESTAL" AND "ESSEX" TYPE CARRIERS

1. *Purpose.*—Study influence of carrier size on carrier landing accident rate—to compare operational effectiveness in terms of accident frequency (and potential) of *Forrestal*-type deck and *Essex*-type deck.

2. *Conditions of study.*—As is the case with any statistical study, variables must be reduced to a minimum and sample must be large enough to limit effect of random variation. In this case:

(*a*) Used same aircraft models throughout (F8U, F3H, F4D, A4D, A3D, F11F)

(*b*) Used same calendar period—to limit effect of weather and material changes in aircraft or ships (July 1, 1956—September 30, 1958).

(*c*) Sample size is of same magnitude (about 20,000 carrier landings).

(*d*) Confined to analysis of landing accidents because this is most critical phase of flight, is most carefully supervised and recorded, and is one in which ship size is a most significant factor.

3. *Definitions.*—(*a*) Carrier Landing—Any touchdown on carrier deck. Includes arrested landings, touch-and-go, and bolters; both day and night.

(*b*) Carrier Landing Accident—Major damage to an aircraft occurring during an actual touchdown on deck, which resulted in termination of the flight or loss of the aircraft over the side. The landing deck area of the ship or its equipment/facilities must have been a factor in the accident.

(*c*) Dollar loss—in initial cost of aircraft only.

4. *Findings.*—(*a*) Period July 1, 1956—September 30, 1958.

Carrier class	Landings	Landing accident rate/10,000 landings	Strike damage	Overhaul damage	Fatal accidents	Landing accident dollar loss
Forrestal	19,037	13	3	6	3	$7,766,100
Essex	23,994	26	17	12	7	26,545,049

(*b*) Last 6 months of above period (April 1, 1958 to September 30, 1958):

Forrestal	9,762	4.1	0	0	0	102,400
Essex	13,878	13	4	5	2	5,578,600

5. *Conclusions.*—(*a*) Operating similar aircraft, the *Forrestal* class carrier has half the landing accidents of the *Essex* class.

(*b*) The *Forrestal* accidents produce only one-fifth the strikes and one-half the overhaul damage of the *Essex* accidents. (None of either in most recent 6-month period recorded.)

(*c*) *Forrestal* experiences only one-half the number of fatal accidents. (None in most recent 6-month period recorded.)

(*d*) Dollar loss resulting from accidents is almost four times as great in the *Essex*.

NOTE.—Since the size of the carrier was not a critical factor in takeoff accidents, they have not been included in this study.

NEW BUDGET FORMAT

Mr. MAHON. Now, one final question. Do you like this new Navy budget format insofar as research and development is concerned?

Admiral HAYWARD. I would prefer to have Admiral Bennett answer.

Mr. MAHON. He can speak for himself. You speak for yourself.

Admiral HAYWARD. Frankly, I do not like it as well as the other system.

Mr. MAHON. Just because you are not familiar with it?

Admiral HAYWARD. Yes. That is one of the reasons because I have worked with the other one, and I am more familiar with that.

Mr. MAHON. I am more interested in any basic thing that you may not like.

Admiral HAYWARD. I have no basic argument.

Mr. MAHON. Admiral Bennett, we would like to have your personal views on that.

Admiral BENNETT. I personally object very strenuously to having this test and evaluation included. I think that it completely distorts the picture. There has been a lot of loose talk about research and development done on procurement money particularly. I particularly resent the research part because in truth there has never been any significant amount of research done on production money. Being an engineer, it does not make sense to me. The separation point is when you complete a development and you want to produce it. When you produce it, you contract with the production agency. Under these rather artificial rules you count the cost of everything down to the articles you are going to put into the fleet, or put into the inventory, and you call it research and development. To my way of thinking this completely distorts the research and development, test and evaluation picture.

Development or production engineering belong in procurement, production money. For test and evaluation, you can make a case either way, but all too frequently one must make tools for production in order to get test and evaluation articles. Again, there is a distortion of the research and development picture.

If I had my way about it we would go back to the old system. We would even purify that and make it research and development up to the point where you have a producible article and the rest of that money would stay in procurement.

Mr. MAHON. If you want a cottonpicker and you want a cottonpicker to pick cotton, you are in research and development, test and evaluation until you have a machine that will go out and pick cotton. So why not count in research and development, test and evaluation all of these funds?

When you have something that will go out and pick cotton then you are in production.

Admiral HAYWARD. There is one big disadvantage in one area in the aircraft business. This really gets into production tools and it increases the time tremendously. If you wait until you get this cottonpicker so it is all set to go into production, you just put everything in series and the time lapse from the time the idea is started until you finally come out with the cottonpicker is much longer because you do not bridge the gap as rapidly if you go after the research and development phase and the production tooling. There is no use building a prototype unless it is on production tooling.

Mr. MAHON. Actually, are you not going to operate generally in the field about the same way you did before? For example, Douglas is making the THOR, or some weapon. The first two weapons are for research and development purposes, but the plant is tooled up. They will use the same tools, the same plant, the same men that produced the items when it is all over with. You do not weight research, development, test, and evaluation with huge sums that can and should be applied to production. You make a good point there.

Admiral BENNETT. The other point in emphasis of Admiral Hayward's remarks, Mr. Chairman, is this: Because of the procurement methods we have to use there is potentially a built-in delay in some of these areas.

Mr. MAHON. That is what I wish you would make clear. Where is this built-in delay in the present system? We do not want to go backward. We want to go forward. If we are adopting a system that will have a built-in delay it is bad.

Admiral BENNETT. Let us take the reverse case of where you do not necessarily do production tooling, where you build true test articles, and where you are going to contact as many people you think you should on a performance basis. Then by separating the appropriations out you necessitated either a change in contract or a brand new contract to cover the item out of production money.

As it stands now you contract out of production money right from the start, after the proof of feasibility, so there is a built-in- minimum delay of 120 days which is about the minimum that anybody can let a Government contract, and this can run up to a year or more, and I predict it will in some cases, though not in every case.

Mr. MAHON. That disturbs me.

I wish you would take the liberty at this point in the record of making your personal view very clear here because we are always confronted with so-called advances which actually are advances in name only and may retard programs.

Mr. FORD. As I recall it yesterday, Admiral Hayward seemed to indicate disagreement with the idea that we were trying to invent on schedule.

Admiral HAYWARD. That is right.

Mr. FORD. Which I understood was a criticism of trying to get into production too quickly.

Admiral HAYWARD. That is right; yes, sir.

Mr. FORD. It would seem to me if you isolate a research and development project by putting it in research, development, test and evaluation, you get away from this production preoccupation.

Admiral HAYWARD. As Admiral Bennett pointed out, as to feasibility, let us take this airplane, which is a good example.

Mr. MAHON. Which?

Admiral HAYWARD. The A2F. We have really looked at this system to come up with a limited war capability, all-weather delivery. We studied it, and finally we made an actual mock-up of the system. This is all in the R. & D. phase. We finally made a decision, and this is where the difficulty is. We figured we could put this system together, the state-of-the-art was such that it would work.

As soon as we make that decision that is when you go over to the ARPN or the production funds.

If you really did this in accordance with the very literal translation of T. & E. this budget would be closer to $2½ billion total than $970 million.

Mr. SHEPPARD. What is wrong with that?

Admiral HAYWARD. Nothing is wrong with this except what Admiral Bennett points out, that when you finally make the decision that you are going to produce large numbers of this item, then you have to go over to the other contractor and production side and there is a delay.

A real good example is the F–8U3 and the F–4H. The F–8U3 would have been T. & E. completely under literal translation of the rules. If you just funded both of them T. & E., you would not have put production tools in. When you made the decision you would have had to make another contract and do the tooling for it.

Mr. FORD. It seems to me that if your objection to inventing on schedule is sound, that this new format is one way that you can keep everything in with the research, development, test and evaluation and do a better job in this particular area.

Admiral HAYWARD. There is a lot of truth in what you say but it is not applicable across the board to all systems and things. There are a lot of things that will fall into just what you say, and I can point to examples where it would work and I can also point to examples where it would not work. A blanket rule will not be the answer, I believe.

There will be times when you will go the other way, particularly with large contracts, particularly with the aircraft business.

Admiral BENNETT. There is another disadvantage, and aircraft are a good example of this.

The R. & D. budget of necessity is relatively small. We are compelled by the state of technology to do many of these things on a basis which will certainly allow for changes and other changes in cost. On the procurement appropriation, which is relatively large, it is much more feasible to provide the funds for such changes. Conceivably, in the extreme case, one could get part of the way down to the F4H program, for example, and were it funded in the T. & E., which is relatively fixed and small, work might have to stop on that until the next appropriation became available.

Mr. MINSHALL. What do you mean by the R. & D. budget being "of necessity" small?

Admiral BENNETT. I used the word "relative," sir. It is small compared to the larger procurement appropriation.

Mr. FORD. That is not what they tell us.

Mr. MAHON. I wonder if you made sufficient differentiation in your testimony in response to my questions and those of others between basic research and applied research?

Admiral BENNETT. When you come to the research areas, both basic and applied, then the test and evaluation does not enter the picture at all. It is only when you get to development.

Mr. MAHON. Any questions, gentlemen?

UNDERSEAS WARFARE

Mr. SHEPPARD. You do not have to reproduce it, but on chart 1–C I was interested in your underseas warfare figure reproduced on this chart.

Mr. Mahon addressed himself to the antisubmarine funds which you said were $174 million.

Admiral HAYWARD. Yes, sir.

Mr. SHEPPARD. Does that $174 million include the $2,457,000 for underseas warfare? Are they separate presentations?

(Discussion held off the record.)

Mr. SHEPPARD. $2,457,000 is underseas. I was wondering whether that figure was incorporated in the response of the $174 million in the antisubmarine figure. Is it part of that figure or is it an isolated figure?

Admiral HAYWARD. Let me put on chart 1–C.

In training devices $1.8 million is for trainers.

Mr. SHEPPARD. It is not included in the $174 million?

Admiral HAYWARD. No, sir. It is included.

Mr. SHEPPARD. Now I address myself to the underseas warfare aspect. In 1959 you showed $1,006,000, and $2,457,000 in 1960, reflecting an increase of $1,451,000 by and between 1959 and 1960.

How are you going to apply the difference? In what particular field of research are you with regard to underseas warfare expenditure which will absorb the difference?

Admiral HAYWARD. I will give you the detailed breakdown. This is all covered under additional training devices, training aids, referring now to this increase. We have a procurement of components. The FBM prosubmarine tactical trainer $207,000; one other is the SS trainer evaluation $253,000. We have $723,000 in a short-based ASW trainer which is included in that $174 million.

SONIC DETECTION DEVICES

Mr. SHEPPARD. You do not have any sonic devices in this fund.

Admiral HAYWARD. These are strictly training devices.

Mr. SHEPPARD. Where will we find any undersea sonic operations in this budget? Where is that shown?

Off the record.

(Discussion held off the record.)

Admiral HAYWARD. On this chart you will find in the detection and classification total of $27,892,000 for the sonar systems.

(Discussion off the record.)

Then you have oceanography, $5.236 million.

I can furnish a detailed listing of that.

Mr. SHEPPARD. I wish you would, either off or on the record. Refer to the page in your justification which carries that. I refer to surface and undersurface functions.

(The information requested follows:)

Sonic antisubmarine warfare detection devices in the fiscal year 1960 R.D.T. & E. program are tabulated below with a cross-reference to the proper page in volume 11 of the Department of the Navy Justification of Estimates for fiscal year 1960, R.D.T. & E.:

Sonar projects	Funds (classified)	Page No.
Surface ship sonar (AN/SQS-33, AN/SQS-26 Lorad and variable depth sonar)	.....	C-6, 38, 39.
Submarine sonar systems	.....	39, C-6, C-14, 40.
Aircraft sonar systems	.....	C-9, C-28.
Fixed acoustic systems	.....	C-6, C-14.

Mr. SHEPPARD. In antisubmarine warfare, what was the Navy's original request before it went to the Secretary's level in the Navy?

Admiral HAYWARD. $246 million as I recall it, but I would like to furnish it accurately for the record.

Mr. SHEPPARD. I want that figure and the figure when it left the Secretary's level and went to the Office of the Secretary of Defense.

Admiral HAYWARD. All right, sir.

Mr. SHEPPARD. And the amount which came out of the Office of the Secretary of Defense.

(The information requested follows:)

The original budget request prepared in January 1958 for antisubmarine warfare research, development, test and evaluation in the Navy totaled $246,330,000. The basic budget submitted by the Secretary of the Navy to the Secretary of Defense contained $174,692,000 for antisubmarine warfare research, development test and evaluation with an additional request for $42,703,000 for ASW R. D. T. & E.

The President's budget submission now before Congress totals $174,692,000 for ASW R. D. T. & E.

Mr. ANDREWS. Referring to that figure of $97.725 million, is that what you have as against your original request for antisubmarine warfare, R. & D?

Admiral HAYWARD. Yes, sir. I can give you a listing of what fell out in the systems. You must remember that this is just the systems. Mr. Sheppard wanted the whole ASW program, which includes basic and applied research.

Mr. SHEPPARD. Off the record.

(Discussion held off the record.)

AWS GAINS IN PAST YEAR

Mr. SHEPPARD. What accomplishments have we made in the last year with the funds we had available in the undersea portion of the program insofar as know-how is concerned?

Admiral BENNETT. The principal gains, if you ascribe them wholly to last year's appropriation, would be in the ——

Mr. SHEPPARD. I know prior years would be cumulative, but the results insofar as any definitization is concerned would be more pronounced in the last year than previously. Is that right?

Admiral BENNETT. I believe that would be correct. I think the principal gains over the last year could be divided into two groups—the improvement of equipments per se, the procurement of improved sonars themselves, but more particularly in the basic and applied research area where we have been spending a rather modest amount of money but all that seemed to be necessary exploring other means of detection.

(Discussion off the record.)

Mr. SHEPPARD. Do you still attach the same significance to these projects which you did as of a year ago?

Admiral BENNETT. Yes, sir, or we would not be supporting them.

Mr. SHEPPARD. Has this been intensified in your research? Taking the whole picture, has the underseas aspect been intensified?

Admiral BENNETT. In requirements, I believe they have been intensified; yes, sir. We certainly intensified our efforts in the antisubmarine area. The money actually has increased in every foreseeable area of value.

ADEQUACY OF ASW FUNDS

Admiral HAYWARD. As you may remember, last year Congress gave us $48 million additional for ASW R. & D. However, I felt personally that we did not have sufficient money in the R. & D. phases, and we need an additional $100 million for 1960.

I still feel that the R. & D. effort is inadequate with the level funding because the effort continues to go down.

You get these horrible choices of what we are going to do. This is getting more and more evident to me, that we are not doing as much we can, technically taking advantages of all of the proposals that we have in this field.

I am sure Admiral Weakley must have covered a good portion of this in his testimony.

Mr. SHEPPARD. He did, but I do not think in the detail that I am interested in seeing developed.

When the record comes down, to the degree that you can, I wish you would give us as much information in this particular field as you can.

(The information requested follows:)

During the last year many well qualified industrial concerns have made a large number of interesting proposals to do all types of work in all phases of antisubmarine warfare research and development.

Because of stringent funding limitations, only a small percentage of these proposals have been followed up with a contract. Only those proposals which the Navy felt were sure to produce an increase in ASW effectiveness were funded. This means that many new ideas which were of a high risk nature

have been left unfunded for lack of funds. It is entirely possible that one of these new ideas could hold the secret to a real successful improvement in anti-submarine warfare. The $100 million additional requirement for ASW R.D.T. & E. contains an appreciable sum which will be used to explore new or novel ideas with the hope of increasing our capability to detect, classify, and kill the enemy submarine.

Mr. NORRELL. I have no questions.

Mr. ANDREWS. I have no questions.

COMPARISON OF NEW OBLIGATIONAL AVAILABILITY

Mr. FORD. I have not seen any place yet in the record a chart showing the overall presentation of dollars for fiscal 1960 comared with fiscal 1959, fiscal 1958: One, under the proposed format for fiscal 1960; and, two, the format of fiscal 1959 and prior years.

I suspect in various bits and pieces it is in the various justification books. I think, however, it should be in the record and in a simplified form.

The proposed format for fiscal 1960 showing the 3-year comparison; another chart using the fiscal 1959 and prior year format for the same 3-year period should be shown. The two charts should follow one after the other, so if we get into a discussion as to increases or decreases we can quickly and readily refer to the charts for comparison.

Admiral BENNETT. We will furnish that for the record, sir.

(The information requested follows:)

DEPARTMENT OF THE NAVY

Research, development, test, and evaluation, Navy, comparison of new obligational availability by budget activity—Fiscal years 1958, 1959, 1960

BASED ON FISCAL YEAR 1959 BUDGET STRUCTURE

[In thousand dollars]

Budget activity	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960
1. Office of Naval Research	$78,717	$84,579	$88,942
2. Bureau of Aeronautics	160,203	184,603	190,105
3. Bureau of Ships	87,530	120,289	122,727
4. Bureau of Ordnance	232,747	423,953	364,148
5. Bureau of Medicine and Surgery	4,474	4,802	4,800
6. Bureau of Yards and Docks	3,262	3,525	3,500
7. Bureau of Supplies and Accounts	947	2,264	2,180
8. Bureau of Naval Personnel	672	764	800
9. Marine Corps	4,854	6,500	5,798
Total	573,406	831,279	783,000

BASED ON FISCAL YEAR 1960 BUDGET STRUCTURE

1. Office of Naval Research	$79,207	$84,550	$88,942
2. Bureau of Aeronautics	177,503	220,330	239,737
3. Bureau of Ships	127,542	156,459	165,890
4. Bureau of Ordnance	309,533	499,155	451,190
5. Bureau of Medicine and Surgery	4,474	4,802	4,800
6. Bureau of Yards and Docks	3,685	3,808	3,983
7. Bureau of Supplies and Accounts	947	2,264	2,180
8. Bureau of Naval Personnel	672	764	800
9. Marine Corps	13,003	13,971	13,398
Total	716,566	986,103	970,920

Source: Justification of estimates for fiscal year 1960 as submitted to Congress.

FISCAL YEAR 1957 APPROPRIATIONS AND OBLIGATIONS

Mr. FORD. What was the budget figure which was requested of the Congress for fiscal 1959 and what was approved?

This, of course, would be under the fiscal 1959 and prior year format.

Mr. EDWARDS. Congress approved $831 million last year.

Mr. FORD. For Navy R. & D.?

Mr. EDWARDS. Navy R. & D.

Mr. FORD. What is your obligation picture thus far as of the last reporting date for the $831 million?

Mr. EDWARDS. The obligation picture right at the moment is $606 million obligated as of the 28th of February, which is 73 percent of the money available.

Mr. FORD. As of the end of February 1959?

Mr. EDWARDS. Yes, sir.

Mr. FORD. What was the percentage figure?

Mr. EDWARDS. Seventy-three percent, Mr. Ford.

Mr. FORD. Is that better or worse than what you have done heretofore?

Mr. EDWARDS. That is a very good figure, as I recall it. It is right about where we expected to be at this time.

Admiral BEARDSLEY. Is it ahead or behind last year?

Mr. EDWARDS. I believe it is a little bit ahead of last year, but I am not sure. I can check it and insert it in the record.

(The information is as follows:)

PERCENTAGE COMPARISON OF NAVY R. & D. OBLIGATIONS AS OF FEBRUARY 28, 1958 AND FEBRUARY 28, 1959

Navy research and development obligations as of February 28, 1959, amounted to 73 percent of the apportionment as compared to 62 percent obligated as of February 28, 1958.

UNOBLIGATED BALANCES

Mr. FORD. What do you expect to have unobligated as of June 30, 1959?

Mr. EDWARDS. That is a little complicated, sir. We expect to have about $14 million out of the research and development appropriation as we now know it.

Mr. FORD. That is the $831 million?

Mr. EDWARDS. Yes, sir.

Mr. FORD. Is that better or worse than what you have done heretofore?

Mr. EDWARDS. That is about normal, sir. The unobligated balance of these appropriations funds can go up or down.

TRANSFERS FROM EMERGENCY FUND

Mr. FORD. Has the Navy made any request for and have any requests been approved for transfers into the account from the emergency fund?

Mr. EDWARDS. Yes, sir.

Mr. FORD. What are they?

Mr. EDWARDS. In 1959 the only ones we received so far total $3,905,250.

Mr. FORD. For what project?

Mr. EDWARDS. Three projects involved—one is the Arctic Drifting Station. One had to be abandoned and a new one established. There was $750,000 involved.

Then there was $155,250 for a psychology project. I do not know the exact makeup of that at the moment.

Mr. FORD. Will you insert that in the record and indicate it precisely?

Mr. EDWARDS. Yes, sir.

(The information requested follows:)

PSYCHOLOGICAL PROJECT

The emergency fund transfer of $155,250 provided funds for the negotiation of a contract with the Smithsonian Institution, Washington, D.C., to conduct research in the area of psychology for the purpose of considering design and use of manmachine systems, human performance capabilities and limitations, decision processes, team functions, persuasion and motivation, and adaptation of complex organizations to changing demands.

This project is under the direction of the Director of Defense Research and Engineering, Department of Defense. The Office of Naval Research performed the contract negotiation of this contract for that office.

(Discussion off the record.)

Mr. FORD. It has been indicated that you have approved for transfer from the emergency fund three requests totaling $3.9 million.

Mr. EDWARDS. As of this date; yes, sir.

Mr. FORD. Have any been rejected for which approval was requested? If so, what are they?

Admiral HAYWARD. None have been rejected. We have three in process right now.

Mr. FORD. What are they?

Admiral HAYWARD. One is the low temperature preservation of blood for $650,000; the other is this high altitude balloon experiment of ONR for $500,000; then we have one in process on what we call Project OCEANUS. In addition to this we have the ASROC for $3.7 million.

We have the exploratory research program which Admiral Bennett mentioned, which is detection of submarines, for $5 million.

Then we have the SIDEWINDER for $6.7 million for an additional total of $37,455,000 from the emergency funds.

Mr. FORD. Are all of those in process of preparation for submission to OSD? Where are they?

Admiral HAYWARD. The first two are already in the Office of the Secretary of Defense.

ASROC and the exploratory research program have been signed out by the Secretary of the Navy. Two which have not yet been signed out by the Secretary of the Navy are the SIDEWINDER and OCEANUS.

Mr. FORD. Are any of these six included in your fiscal 1960 budget?

Admiral HAYWARD. Yes, sir. One of the ground rules for any emergency funds is that we have to make our program so that we can pick up support of these projects the following year for which we want funding this year (fiscal year 1959).

This gives us flexibility to start right now instead of waiting until 1960, particularly on things such as the ——— where we have come on to something we want to exploit. We have to assure continuing

support of these projects. We cannot go back for emergency funds next year.

Mr. FORD. In other words, the requests here are for the initiation of projects which, if approved out of the emergency funds, would be further supported in your basic budget for fiscal 1960?

Admiral HAYWARD. This is correct.

Admiral BEARDSLEY. Off the record.

(Discussion held off the record.)

Mr. FORD. These six items that are in various stages of presentation to the OSD are projects which have materialized unexpectedly in the last 6 to 8 months?

Admiral HAYWARD. They have gotten to the point where we decided we should prosecute them, yes. We actually went and had a demonstration, for example, of ———. Nobody really believed this could occur. We cannot explain it theoretically from a physics point of view, but the phenomena may exist. There is no longer any point in denying it. We may have something there and we have to exploit it. We made the decision to do this.

Admiral BENNETT. If I may add one word, Mr. Ford, I think 6 to 8 months is something of a distortion.

You have to remember that these are items which have occurred since the formulation of presentation of the last budget. This could be a good deal more than 6 to 8 months in an extreme case.

REPROGRAMINGS

Mr. FORD. When you submitted the budget for fiscal 1959 of $831 million you had, as you had in the presentation here, certain programs which when put together come to the total.

Have there been any basic changes in the fiscal 1959 program between presentation and execution?

Admiral HAYWARD. Yes. You will find we always go through a series of reprogramings.

I had studied all of the services. In the Navy sometimes it can run as high as 47 percent in reprograming. The other services run a little higher from the time it is formulated until the actual execution of it.

As an example, right now we are starting in the 1961 budget. We have not finished our 1959 accomplishment. We have not gotten our 1960 yet, so the 1961 program cannot be very firm. You just cannot do firm long-range planning in the technical R. & D. business.

Mr. FORD. I am not being critical. I am simply trying to find out what these basic changes are between formulation and execution. Forty-seven percent does seem high, but if that is the way it works I think the committee ought to have some feel of what the changes are. Otherwise these hearings we go through every year are purely academic.

Admiral HAYWARD. No, sir; I can give you some examples.

For instance, in the nuclear propulsion field the money was withheld by the Bureau of the Budget for a long time. This has been a very uncertain area.

We reprogramed in the "Military sciences" here. As an example, in the packaging and corrosion project we reassigned it to "Aircraft and related equipment" from the $420,000.

I have an actual list of the reprograming actions involved in 1959 which we can furnish for the record, and I think the committee would be interested in that.

Mr. FORD. I think it would be helpful.

You do not have to run through them, but show major areas where there have been reprogramings. That should be in the record.

(A classified statement was submitted.)

Admiral HAYWARD. That 47 percent might be misleading. I looked over past years and it is not related to any particular sum of money.

For instance, the budget procedures have changed and that is a very rough estimate of what it looked like from the original thinking when we start the program now in the Department of Defense.

The first program I propose, by the time it has gone through all of the procedures and finally the fiscal year has closed out, you will find it runs about 47 percent difference over various changes which have occurred.

That is not just in Congress, of course, but that is in the arguments, selectivity of the systems, and work we are going to do.

It is not that high with respect to what actually is appropriated.

Mr. FORD. I think you may be anticipating the feeling I have. If you have even as high as a 40-percent change between the initial submission of the budget and the execution of it, as far as programs are concerned, and there must be some relationship in dollars, then I cannot help but question the validity of a budget request of a greater amount than the funds before us because you cannot be too specific about the amount over and above the budget.

Admiral BENNETT. I think what you are really trying to get at is what is the reprograming from the time of appropriation.

Admiral HAYWARD. That is what you want.

Admiral BENNETT. After all, the committee goes over the budget and recommends an appropriation which is made by the Congress.

I do not believe we have that figure at hand but I am sure it is considerably smaller than any 47 percent which was the whole process. I think we can furnish that for the record.

Mr. FORD. I just used the figure which was quoted here. I was surprised it was that high, but I am using that figure which, if it is accurate, indicates that about 50 percent of your R. & D. budget changes between presentation and execution.

Mr. EDWARDS. No, sir.

Mr. FORD. If that is true——

Admiral HAYWARD. That is not true, sir. When you get to the appropriations side, such as we are now, it is nowhere near that. I would be surprised if it was 5 or 8 percent fundwise in reprograming.

Mr. FORD. Leave aside the funding of it. If the internal programs changed as high as 40 percent between presentation and execution, then it casts some discredit on any requests for money over and above the budget because you cannot be specific in what you want even in that basic budget area.

Admiral HAYWARD. You have to relate that statement to the overall process of how we arrive at our programs.

You have to do it in detail, by project task actually, and you have to go into task detail.

Therefore, when we finally come here to present our budget, it has really been examined, and the selectivity process has been tremendous,

to arrive at what we want to do with that $970 million, for instance, in the 1960 program.

From now until the end of the fiscal year 1960 you will find that the reprograming is very, very small.

Mr. FORD. Could it be 5 percent?

Admiral HAYWARD. We can furnish the figures to you. I do not know.

Admiral BENNETT. We have some of the figures here if you would like to hear a few of them. You have to go clear down to the project level to find them.

Mr. FORD. I am not interested in finite details, but I was amazed at the 47 percent figure.

Admiral HAYWARD. I misled you, Mr. Ford, because in doing this and taking this look at all of the systems since about 1950, one of the things that has impressed me is that it is more important for us to be highly selective in what we actually do, and I was going through the previous years' processes in all of the services.

It was not just related to when we get to the appropriations.

There are minute tasks, so I apologize for misleading you with this 47 percent.

We can show you on the record how small it actually is in the appropriation.

Mr. MAHON. I might suggest you give us a statement indicating the modifications of significance for the last year or so.

We have had statements in the past for the overall budget as to the changes and reprograming action. The sums in some cases are rather considerable but the percentages are almost infinitesimal, so I think there has been some confusion with regard to the real facts.

(Discussion held off the record.)

Mr. MAHON. We will resume at 2 o'clock, gentlemen.

Mr. SHEPPARD. Gentlemen, the committee will come to order.

Mr. Ford, you have the witness.

R. AND D. SUPPORT OF ATTACK CARRIER OPERATIONS

Mr. FORD. Admiral Hayward, what programs or projects in the R. & D. proposal for fiscal 1960 relate to the attack carrier operations? I do not mean every specific one, but the broad categories where you are trying to do something with R. & D. that will make more effective our attack carrier group.

Admiral HAYWARD. Of course there is the arresting gear and the catapult situation which we discussed. Then there is the aircraft situation which I have discussed—the F4H on which the decision was made, and the A2F aircraft in front of you, and the W2F systems. We have also the automatic all-weather aircraft landing system.

In connection with that, it is very interesting to note the ability of the *Forrestal* class carrier to operate 345 days of the year out of 365, versus about 200 days out of 365 for the *Essex* class. This is based on the worst operating conditions in the North Atlantic and the Norwegian Sea.

We are pursuing, of course, the advanced missile system with the aircraft for heavy attack carriers. We are also pursuing the BULLPUP, which is on the missile side, and the CORVUS on the missile side for air to surface.

AIRCRAFT DEVELOPMENT

Mr. FORD. May I ask what aircraft are you working on or do you propose to work on in R. & D. with fiscal 1960 funds which will produce aircraft that would be applicable to the *Enterprise* or the *Forrestal* type ship that would not be applicable to the *Essex* class?

Admiral HAYWARD. The best answer to that is to give you our aircraft family as it is coming along.

There is the A2F which I covered, and the W2F. There is the F4H. There is the A3J Vigilante, North American. And of course there is the present A3D–2 aircraft.

Mr. FORD. All of these aircraft operate on the *Forrestal* or *Enterprise*, but not on the *Essex* class?

Admiral HAYWARD. They are very marginal. You can put the A3D, for instance, on the *Essex*, but it is a very marginal situation. Your sink rates are very high. We would do it only under——

Mr. FORD. What will these aircraft do that your current inventory will not do in the way of a strike capability or any other essential military operation.

Admiral HAYWARD. For instance, we have gone from 400 miles an hour to 1,300 miles an hour in speed. Deliverability of weapons has increased. Load carrying capacity has increased. The ability to operate under worse conditions day and night and in weather has increased. You do not have that in the *Essex* carrier at all. You do have it in the *Forrestal* type hull.

Mr. FORD. What is this new air-to-surface missile that you are working on which will have a greater range, and greater lethality?

Admiral HAYWARD. The CORVUS.

Mr. FORD. Could that be usable on the current inventory of aircraft which are more or less limited to the *Essex* class carrier?

Admiral HAYWARD. No, sir; it could not. It is built around the modern aircraft which are coming. The future Navy, as we look at it, is based around those aircraft, and in the time period of 1961–65 and even 1965–67, these aircraft will be operating. They are modern Mach 2 aircraft. They are optimized for maximum flexibility in the delivery of either special weapons or conventional weapons, and to give us the greatest efficiency in numbers and actual operating times over the *Essex* class.

STRIKING POWER OF CARRIERS COMPARED

Mr. FORD. How much difference in striking power in 1963 to 1964 would a new *Forrestal* type aircraft carrier have, compared to an *Essex* type aircraft carrier that was reaching the point of obsolescence?

Admiral HAYWARD. For instance, the aircraft load goes up. By 1965, on the *Forrestal* type and the *Enterprise* type you would have 120 percent increase in the actual loadings over the present-day *Essex* with the present-day aircraft. These aircraft in the era I am talking about could not go on the *Essex*, you see. The A3J could not go on them.

Mr. FORD. Is there anything which you could put in the record which would be concrete and specific comparing striking power—range, firepower—a valid comparison which is perfectly legitimate as

to what the *Forrestal* class carrier of that era will be able to do compared to an *Essex* class carrier in the same time period?

Admiral HAYWARD. Yes, sir. For instance, I will start with the ordnance capacities. Taking the *Essex* as 100 percent, the *Forrestal* would be able to deliver 320 percent of bombs versus the 100. The *Enterprise* would be able to deliver 350 percent.

In special weapons, taking the *Essex* once again as 100 percent, the *Forrestal* will deliver 310 percent of special weapons, and the *Enterprise* will deliver 400 percent, a factor of 3 more than the *Essex* class.

In the actual operational safety, for instance, landing accidents per 10,000, on the *Essex* class carrier with the present aircraft that the *Essex* operates, they will have 43 to 45 accidents per 10,000 landings. The *Forrestal* class will have 22 accidents per 10,000 landings, which is a factor of 2, really.

In the actual movement and running of the aircraft, for instance, in launching X number of aircraft—you can pick a figure—it would take the *Essex* 15 minutes to launch everything. At the same number, the *Forrestal* will do it in half that time, 7 minutes.

The increased flight-deck area and additional elevator and catapult facilities of the *Forrestal* provide much more efficient aircraft handling. During sustained flight operations, the *Essex* requires more than 40 percent more aircraft movements and greater than 50 percent more elevator movements than the *Forrestal*.

An interesting figure on landings and why the problem of the 750-foot landing space is so important is that in the *Essex* class you have a glide angle of 11 degrees with a sink rate at 110 knots of 12½ feet a second, which is a tremendous load for a 60,000-pound aircraft. The *Forrestal* cuts that down to roughly 8 feet a second, and with the additional landing area it gives you a much more reasonable type of approach in landing from an aircraft point of view.

The *Essex* has about 520 feet available for runway length, while the *Forrestal's* runway is 720 feet. The 200 feet additional length is applied about equally to two of these four areas, which are the approach area and the landing area.

On the angled deck ship, the length of the landing runway is closely tied to the total ship size. This is what gives us our overall size.

The runway angle of 10 degrees is necessary for safety in handling and to take maximum advantage of the angled deck. We used to have very serious accidents going into the other aircraft, as you know. The modern aircraft that we have today physically require for their weight, momentum, speed, and performance, this size landing area.

PROGRAMS CONTRIBUTING TO IMPROVED ATTACK CARRIER OPERATIONS

Mr. FORD. What percentage of your R. & D. budget for fiscal 1960, within reasonable limits, is related to a better attack aircraft carrier?

Admiral HAYWARD. I would like to furnish that for the record, because this comes out of the SCN funds as well as R. & D., but they are related. I will furnish that figure for the record.

Mr. FORD. Not only the percentage figure, but the kind of programs that are in your budget presentation for an improved attack carrier operation. I presume it would be reasonably substantial; would it not?

Admiral HAYWARD. Yes, sir.

(The information requested follows:)

Roughly, 10 percent of the fiscal year 1960 basic R.D.T. & E. program contributes to improved attack carrier operations. (A classified statement of programs was submitted to the committee.)

NEED FOR NEW CARRIER

Mr. FORD. What is your personal view about the need and necessity for a conventional or a nuclear-powered carrier for fiscal 1960?

Admiral HAYWARD. My view is that we need the carrier. If we are dollar-limited, the difference in cost is such that I would take the conventional carrier. We actually need the carrier, however, because if we do not have the carrier, in years to come we shall not be able to meet our commitments.

Mr. FORD. You would take the advantage of a good share of the R. & D. work you are submitting here as a witness for fiscal 1960?

Admiral HAYWARD. That is correct. The reason that you need this carrier, from my point of view—and I cannot understand why people get so confused trying to decide on telling you how to do the job. For years this has been quite a mystery to me, because nobody objects to the fact that you did not put the 707 in Washington National. You used Friendship. When the jet engine came, this immediately dictated your size. It is not a supercarrier. It needs 720 to 750 feet landing area.

People say, Why don't you come down in size of aircraft? Its momentum, one-half mv^2, really is licking you. You have to have modern aircraft. Our experience and nothing that has gone on in the situation in limited wars has changed our ideas that manned aircraft and the Mark I "eyeball" is still here to stay. This ability of ours to project our power across the sea is dependent on the aircraft carrier.

Mr. SHEPPARD. Will the gentleman yield at that point.

Mr. FORD. Surely.

Mr. SHEPPARD. While you are touching on that particular aspect of the requirement, I am slightly disturbed by some interrogations in the past presumably upon the premise that for limited warfare we can use what we have and do not need anything else.

From an operational point of view, gentlemen, is that correct? In other words, what is the vital difference between warfare, whether it is limited or all out, if you have to have it? What is the difference? You may not use all the appurtenances you have in the limited war, I grant, but in the ultimate requirement one is likely to touch off the other, is it not?

Admiral HAYWARD. That is correct.

Mr. SHEPPARD. I do not want to continue too long, Mr. Ford, but to me this is extremely important. I cannot draw the sharp line of demarcation which is drawn by some, that we will prepare for limited war because nothing else is going to happen, and this will take care

of everything. I am not in accord with that assumption or evaluation. Whether that be the case or not, if you were exposed to anything of a potentially enlarged character, it is rather obvious to me you had better have what you are constructing, whether it be ships or anything else, capable of doing an all-out job, if you have to use it, because it can always be reduced in its operational requirement as against taking the smaller and trying to enlarge it on short notice.

Is that right or wrong from the military point of view?

Admiral HAYWARD. That is correct, Mr. Chairman. The benefit you get in the all-out situation is there. It is just the same as that we are going to shoot conventional weapons instead of nuclear weapons, but you could use the nuclear if you wanted to in the all out, and you have the capability. You are essentially correct.

Mr. SHEPPARD. I draw the same analogies that you do, perhaps expressed differently. We find ourselves acquiescing to other military requirements in their total. Yet when it comes to consideration of the flattop, we seem immediately to back away from it and say, "All right, you go do a man-sized job but you may have only a boy's vehicle to do it with." I do not understand that. It does not square with me. If you could explain those differences, I would be most appreciative, if there is any actual difference.

Admiral HAYWARD. I agree, Mr. Sheppard. I do not understand why we have this particular psychological thing just about the flattop, but it is this way. People go around referring to the supercarrier and the rest. The opposition is going to have first-class aircraft. We know that. So we have to have first-class aircraft. I always remember that in World War II, I was with the RAF and I was with our Navy, and we used to have a famous message from some of our planes: "Trailing enemy carrier. Notify next of kin." I do not want to do that to the future naval aviator.

ADVANTAGES OF NUCLEAR-POWERED CARRIER

Mr. FLOOD. Will the gentleman yield?

Why don't you ask for a first-class carrier?

Admiral HAYWARD. Mr. Flood, I say that in the money limitation——

Mr. FLOOD. I am not talking about money.

Admiral HAYWARD. We are asking for a first-class carrier.

Mr. FLOOD. No, you are not.

Admiral HAYWARD. You think it should be nuclear?

Mr. FLOOD. Certainly.

Admiral HAYWARD. Nuclear has advantages. I do not argue that. But when I can get the additional destroyer and the submarine for that, would I not be very wrong not to do this?

Mr. FLOOD. In my opinion, yes. If you are going to let the Bureau of the Budget run the Navy, that is it. I want to know. That is what you are doing.

Admiral HAYWARD. Yes, sir; Mr. Flood. There is no argument about that, Mr. Flood.

Mr. FLOOD. That is all.

Mr. LAIRD. Mr. Chairman.

Mr. SHEPPARD. Mr. Ford has the time.

Mr. LAIRD. I do not believe it is the Navy's position, even if they had additional money, to put it into an atomic powerplant for the carrier. In the add-on budget you have many things of higher priority than putting atomic power into a second carrier.

Admiral HAYWARD. Once again it comes down to limitations. I had Admiral Burke's testimony here. He has the hard decision to make. There are a lot of things we are not doing that we should do, not only in the R. & D. field.

Mr. LAIRD. This decision was made by the Navy. Even if you were given additional money in the amount required to give nuclear propulsion to a second carrier, you would not use it for that purpose.

Admiral ENSEY. That is right.

Admiral BEARDSLEY. That is right.

POSSIBLE FUNDING OF LONG LEADTIME ITEMS FOR NUCLEAR CARRIER

Mr. FORD. There is testimony to that effect, Admiral Hayward.

However, several weeks ago it seemed to me that a second alternative was a possibility. It did not receive very considerable consideration from the witnesses who were here on behalf of the Navy, but I still think it makes sense. In fiscal 1960 we come up with sufficient funds for long leadtime items in a second nuclear carrier with the additional funding for the remainder of the carrier in fiscal 1961, rather than to compromise and take a nonnuclear carrier in fiscal 1960. The difference in operational availability, as I recall the testimony, was something between 6 and 8 months at the end of the line.

Of course, if you do not have a war, it does not make any difference. If you do have a war, naturally it would be more favorable to have that nonnuclear carrier 6 to 8 months earlier than a nuclear one that much later. But if you really want a first-class carrier in the long pull for a 20-year period of usability, my suggestion seems to make sense to me, anyhow.

What is your observation on that, Admiral Hayward?

Admiral HAYWARD. Mr. Ford, I had not considered it in that light at all. I have read a good portion of the testimony. I do not know who testified to this.

Mr. FORD. Admiral Beakley, Admiral Pirie, Admiral Mumma, and several other witnesses were here at the time. I am in favor of the program which is in the budget, but you have to think of alternatives. This makes sense as an alternative to what was proposed.

Admiral HAYWARD. The other carriers are wearing out. Of course, as the chairman said this morning, it is incumbent upon us to get the maximum for the dollar that we have. From the decision that was made we do get the maximum for the dollar.

Mr. FORD. Except at the end of the line you have a nonnuclear carrier rather than a nuclear one.

Admiral HAYWARD. That is right. There is no question about that.

Mr. FORD. So I am not so sure that in a 20-year period of usability you do get your maximum return if the nuclear carrier is sound in the first place and has certain advantages, some of which you enumerated a few minutes ago.

NUCLEAR-POWERED AIRCRAFT

You mentioned in your presentation something about a nuclear-powered aircraft. What is the Navy doing in this field? How much is being proposed in the R. & D. budget for 1960? What progress are you making? Just what is the situation?

Admiral HAYWARD. This has been a long, difficult program, Mr. Ford. I probably have been one of the outstanding critics of it. To my way of thinking it is a monument to how not to run a technical program. Eight hundred and fifty-three million dollars has been spent on changing concepts that have been false and unattainable. It is still a poor program with little hope at present from my point of view.

We have taken the approach that we want a relatively low-powered, long-endurance seaplane for logistic purposes as well as ASW and AEW purposes.

Mr. FORD. This is the Navy's program?

Admiral HAYWARD. Yes, sir.

To give you some history on it, last spring the Joint Committee requested that we present what we thought on this program, which we did. Then they asked us to recommend a national nuclear-powered aircraft program to the Joint Committee. We recommended a program.

(Discussion off the record.)

Mr. MINSHALL. What are the *Princess* boats?

Admiral HAYWARD. They are built by Saunders Roe in Britain. They are seaplanes of 300-some-odd thousand pounds gross weight. We proposed this as a national program to the Secretary of Defense.

We did not believe in the approach which had been taken. I never have believed technically in it. It was turned down by the Department of Defense. The Navy would not support it on our own funds. We did not have sufficient funds to support it. I also felt that while the military potential was great, I would be the last one to get up and say this is the system to end all systems.

Mr. FORD. In the alternative, did the Air Force submit a program?

Admiral HAYWARD. Yes, sir.

Mr. FORD. Is that the one which is being funded by them in their R. & D. budget?

Admiral HAYWARD. Yes, sir. There is $150 million for this program in the present budget. They came in with a proposal for the camel system, they call it, which is a continual patrol by nuclear airplane which launches ballistic missiles. This would be the same in

my opinion, as if Admiral Rickover had said that we would put the POLARIS in the *Nautilus* submarine. The fundamental truth about the nuclear propulsion business is that we do not have a successful fuel element.

The total sum that has been spent to date I have compared with what we have spent in the Navy, and in Admiral Rickover's program for the same sum of money we have done all of the research and development, we have paid for all the fuel costs, we have built all the facilities, we built the prototypes, and we have delivered three operational submarines to the fleet for the same cost.

Of course, I attribute this directly to Admiral Rickover's position that he was going to get an engine before he got any sort of system.

This program has suffered from a changing concept. When it was first envisioned, everybody wanted a nuclear bomber that went at mach 3. Any physicist could have told you that the radiation and temperature problems were insurmountable at that time and for many years to come.

So it has gone back and forth over the years.

I feel the indirect cycle has application to the Navy's use in the low-power field, 60 megawatts to 100 megawatts, in the turboprop version for use for logistics and for ASW and AEW.

We put $2 million in the 1959 program which had been impounded. I insisted that we put this at the Pratt & Whitney plant in the development of the liquid systems, the cooling, the radiators, and the components. Our total effort in 1961 will be roughly about $4 or $5 million, but primarily in the components of the system and in trying to get a turboprop engine married to a reactor. Until you get the components made, you are not going to get an overall system. This has been the Navy's position.

Mr. FORD. The Navy's program, then, is proceeding independently of the Air Force program.

Admiral HAYWARD. No, sir. We wrote a letter to the Secretary of Defense, who also wrote to the Atomic Energy Commission and the Canal facility up in Connecticut, which is an Air Force facility operated by the Atomic Energy Commission. We are closely allied with the Air Force program. They are interested in the liquid metal cycle, also. However, it is further away. And they have the direct air cycle, that big engine out at G.E., and they have to do something in it. We do not believe in a direct air cycle. It has some very fundamental drawbacks to our problem. It has the divided shield instead of the unit shield. It exposes all of our equipment to radiation. We just cannot live with it.

Mr. FLOOD. Will the gentleman yield?

I am wondering, what is the important thing in nuclear propulsion for air—experts in nuclear engines and propulsion, or experts in aerodynamics? Which comes first, the chicken or the egg?

Admiral HAYWARD. In this particular case, an airplane needs an engine, and in order to get an engine you need materials, you need high-temperature materials. You need materials that will last at 3,000°, for instance, for long periods of time.

Mr. FLOOD. If the gentleman will yield further, that is the question. That is no answer. My question was, What do you need first, the engine? Do you need an expert in nuclear propulsion and nuclear mechanics, or do you need first an expert in aerodynamics?

Admiral HAYWARD. You need the nuclear propulsion. You do not need the expert in aerodynamics. He is the least of the problems.

Mr. FLOOD. If the gentleman will yield further, in what is Admiral Rickover an expert?

Admiral HAYWARD. Nuclear propulsion.

Mr. FLOOD. Then why don't you have him figure out nuclear propulsion for an aircraft?

Admiral HAYWARD. Mr. Flood, he has 33 ships. We have plenty to do in the ship business. The last person I want to get mixed up in taking over the job is Admiral Rickover.

Mr. FLOOD. I asked the Air Force that, and they said they would take him tomorrow morning and be glad to have him.

Admiral HAYWARD. I am not so sure.

Mr. FLOOD. I am telling you what they told me.

Admiral HAYWARD. It would be an excellent idea.

Mr. FLOOD. If he did as much for the Air Force as he did for the Navy, I hope he goes tonight.

Admiral HAYWARD. I do not want to say that aircraft nuclear propulsion is the end-all in military systems. It has great military potential.

Mr. FLOOD. Nobody suggests that it is.

Admiral HAYWARD. I do not want to give away Admiral Rickover, Mr. Flood. We need him.

Mr. FLOOD. No. I am trying to give him to the air arm of the Navy. They seem to be bogged down in the nuclear propulsion mechanics hardware. This man seems to be more than a black shoe sailor. If the first things come first, it is how do you push that crate? I do not care what kind of crate it is, whether it is a ship in the air or a ship in the water. If this character Rickover can push it on and under the water, as far as I am concerned he can push it in the air.

OPERATIONAL DATE FOR NUCLEAR AIRCRAFT

Mr. FORD. What is your forecast, Admiral Hayward, as to when you will have an operational aircraft in this area?

Admiral HAYWARD. We feel by 1964 in our program we will have one in the air. It could be done sooner in the national program I propose, if somebody wanted to do it just to get it in the air for psychological reasons. You could get it in the air in a different way. You would not have to use direct air cycle in the seaplane. My proposal was that we go ahead and do that, and if we wanted to put "U.S. Air Force" on the seaplane, that was fine by us. We did not want to argue about who was going to make the first flight. It was determined not to do that. So we are engaged in an orderly R. & D. program of materials, components, and engine development. We would say by 1964 we should be able to put a seaplane in the air.

Mr. FORD. You will then have a prototype that will have some practical application from a military point of view?

Admiral HAYWARD. It will be a test bed, Mr. Ford; it will not be a system. We will determine then whether we would go to a system. You see, this is where I say we get into large costs by saying right away we will go to a system. This is where I disagree with the proposal of making a Camel system; for instance, of having an air-launched ballistic missile from a nuclear airplane. You haven't a nuclear engine, let alone the missile or the airplane. To make the decision now, it is billion-dollar decision, practically. I do not want to do that until I have done my homework and done the component work.

Mr. FORD. That is all, Mr. Chairman.

Mr. FLOOD. Will the gentleman yield?

Mr. FORD. Surely.

Mr. FLOOD. Just one thing. Mr. Andrews and I just came to one of our many conclusions. Mr. Andrews and I have come to a lot of conclusions. Nobody pays any attention to them, but down here in the corner out in left field, we have everything all figured out. We're going to let you all in on it.

We have noticed a lot of debate here off and on during the years about different systems for rifles, different systems for tanks, different systems for everything—two or three different systems. Now you are all uncertain with the Air Force about the specific scientific, technical, mechanical system for nuclear propulsion of an engine for an aircraft.

Admiral HAYWARD. That is correct.

Mr. FLOOD. They are going down one street and you are going down the other. Of course, that is where we come in. We have been listening to this for 15 years, all kinds of systems from sidearms to THOR and JUPITER. It is the same story. There is nothing new about that.

So what happens? Nothing ever happens to any of those systems, Admiral. Some of them are still going on 15 years later, up until today, and no decision. But in every instance, without exception, where the Russians have announced or executed their decision in that area of dispute on our side, whether it be projectiles, missiles, satellites, no matter what, every time the Russkies pick something and shoot it, in less than a year, in every case, we have resolved our doubts, our equations, and we have got it.

Is the same moth-eaten, tired example, going to hold true in nuclear propulsion for an aircraft? Are we going to go on with this bug year after year until these Russians fly one, and then 1 year from that day so will you? Everything will clear away. That has been going on on just as tough a problem as this one.

Admiral HAYWARD. You could have flown an airplane years ago, Mr. Flood.

Mr. FLOOD. I know that. You see, the trouble with you fellows on that side of the table and this array of genius and talent here is that with God's help and our constituents, we go on like Tennyson's brook. We sit here 5, 10, 15, 20 years in this chair. You fellows come and go like buses—Secretaries of Defense, Assistant Secretaries, admirals, generals, Joint Chiefs of Staff. We have lost track of them. There have been hundreds of them sitting over there.

So when you say to me that is not going to happen, I am not questioning your belief. I am more of the precedent of a whole series of witnesses who have said the same thing. They have always been wrong.

Admiral HAYWARD. Let me get back to the aircraft nuclear propulsion.

Mr. FLOOD. That is where we started. We haven't left that.

Admiral HAYWARD. The decision was made, Mr. Flood. There wasn't any lack of decision. The decision was made not to do it.

Mr. FLOOD. I don't say it has to be affirmative. It can be just as bad negatively.

Admiral HAYWARD. That is right, but it was made.

Mr. FLOOD. In fact, it generally is.

Admiral HAYWARD. But it was made.

Mr. FLOOD. Secretary McElroy walked into my office just the other afternoon with a magnificent hat, with great ceremony, under the auspices of my friend, the general down here, who brought him in by the hand, with great ceremony and formality. He was paying off a bet. McElroy gave me the hat. He saw Rex Harrison in London with it on. He said the only other fellow who can wear that—not only that, but the only other fellow who would wear it—is Flood. So he brought me the hat.

Now I will bet you a hat, no matter where you are, that the minute these screwballs in Russia fly one of these planes with nuclear propulsion you are going to be in here within a fiscal year together, somehow, and we will have it. Whether you are in the Pentagon or on some carrier task force, you go ashore and get me my hat.

Admiral HAYWARD. Mr. Flood, as I say, I will take your bet, because in my testimony to the Joint Committee I said the one thing you can do is to prepare the people for the fact that the Russians are going to fly a nuclear airplane.

Mr. FLOOD. Yes, sir. Then your bet with me is that within 12 months after the Russians fly one.

Admiral HAYWARD. You won't? That is the bet.

Admiral HAYWARD. I will take it.

Mr. SHEPPARD. May I say that gambling is illegal in this room. My friend from Pennsylvania has too many hats now.

Admiral HAYWARD. He won't get this one.

Mr. SHEPPARD. The gentleman from Wisconsin.

Mr. LAIRD. I have no questions.

Mr. SHEPPARD. Mr. Weaver.
Mr. WEAVER. I have no questions.
Mr. SHEPPARD. Mr. Minshall.

BOMARC PROGRAM

Mr. MINSHALL. In yesterday's testimony, Admiral Hayward, you rather strongly opposed the NIKE-ZEUS program as being entirely unfeasible and not practical.

Admiral HAYWARD. I said I did not believe that it was ready for production. I said I would do the research and development on it.

(Discussion off the record.)

Mr. MINSHALL. To quote you, you said as follows:

> You bring a system in and say it is all ready, and then you pour the money down the drain, and what happens? You have system after system which has cost the country millions—my only addition there might be "billions"—when we try to invent on schedule. BOMARC is another good one. We were talking of BOMARC in 1948 and now this is 1959.

I wonder if you would care to elaborate on the BOMARC situation.

Admiral HAYWARD. It is the same sort of thing where we say we are going to put a system together and we have not done the components. The aircraft nuclear propulsion program is even better than those in that you have gone now 11 years. You had a concept and you tried to make a system before you had the fundamental components of the system available.

Mr. MINSHALL. Based on your knowledge of the BOMARC system and NIKE-HERCULES and NIKE-AJAX, TALOS, and other ground-to-surface weapons, do you believe that we should invest any more money in the BOMARC system? They have already spent $1.7 billion and they are now asking for close to $500 million more.

Admiral HAYWARD. Since the air defense business of the United States has gotten underway, we have spent $25 billion to defend the United States against the manned bomber.

Mr. MINSHALL. Since what date, Admiral?

Admiral HAYWARD. That is the current investment to date, $25 billion.

Mr. MINSHALL. Current from what date?

Mr. FLOOD. When TALOS started.

Admiral HAYWARD. From about 1949, I would say, when SAGE, DEW line, interceptors, and BOMARC were initiated. I do not believe in Fortress America. If we go to Fortress America, the free alliance is going to die, and the proposal to put billions into these fixed systems for defending the United States I do not buy. I do not agree with it. This is my own personal opinion.

Mr. MINSHALL. You think it is another Maginot line.

Admiral HAYWARD. I certainly do.

Mr. MINSHALL. Would you feel, then, that we should put any more money into the BOMARC system?

Admiral HAYWARD. Personally I say no, I would not.

DUPLICATION IN SERVICES RESEARCH AND DEVELOPMENT PROGRAMS

Mr. MINSHALL. You make them a pretty strong case for a single service. You said that there is a lot of overlapping and duplication when you say we have spent $25 billion since 1949 in defense against some manned bombers. Do you think that it would be better if we considered things on a single service basis?

Admiral HAYWARD. I do not see how you read from my testimony I am for a single service.

Mr. MINSHALL. I am just reading between the lines, whether it be all Navy, Air Force, or whatnot. As far as research and development is concerned, we would save the taxpayers of this country a lot of money, would we not?

Admiral HAYWARD. Not necessarily, no, sir.

Mr. MINSHALL. Certainly from the research and development point of view, which is your specialty as of now.

AIR DEFENSE SYSTEMS

Admiral HAYWARD. No, sir. My feeling on the systems, as I told you, if you look at them all—and again this is my personal feeling—look at the things technically and the time that has gone, and this Fortress America concept is wrong for the simple reason in looking at the future Navy, which is my problem, as the POLARIS succeeds, I have the problem of fighting against him. He is off of Acupulco and he lets you have it in Dallas, and it does not make any difference whether you have BMEWS, BOMARC, or anything else in the time period. I do not want to pour anything more down this business.

We are a member of a free alliance. There are 45 nations allied with us. We swim or sink with this alliance, and if we go to Fortress America, and just forget it, we are going to die.

Mr. FLOOD. I would like for you to repeat as nearly as you can verbatim, or if you prefer have the reporter read it, the first answer you gave to the question of my friend on your concept, attitude, and opinion about Fortress America, plus $25 billion. You tied it to one big package. Can you repeat that?

Admiral HAYWARD. I think that I can. To date the investment in this Fortress America concept, as I call it—the DEW line, BOMARC, the interceptors, the rest of the system—is $25 billion. The proposed funding for this gets as high as $49 billion by 1963. I do not believe in Fortress America. I believe that we are a member of a free alliance, and we will live or die with this free alliance, and if the free alliance dies and if we lose the rest of the world, we are going to die with it. So it is incumbent upon us to rely not only our strengths and to use them across the sea wherever we can, and when we tell our people that we are going to defend them from these things we are wrong.

Mr. FLOOD. You used a sentence that piqued my curiosity. You said that you do not believe in extending further the $25 billion investment made in all of this Fortress America defense organization of SAGE and BMEWS, created and existing only for the purpose of defending against enemy bombers.

Admiral HAYWARD. I believe, Mr. Flood, that in the time to come technical progress is going to make every system that is subject to destruction by surprise obsolete. What do you buy? You put billions in it for 15 minutes' warning. That is not going to get you any place. The most important thing is we have to have the ability to destroy Russia and Russia has to know this. It is what the Russian thinks, not what you or I think. You have to have flexibility. Never again will you be able to go down one street like SAC, or anything of that kind. It is wrong. You will not be able to do it.

Technically, anything that is subject to destruction by surprise attack will eventually fade and die away because you cannot afford it. It will not be successful. The Russian will know this.

Mr. MAHON. Everything will eventually fade away. All things will perish, including all the military systems of the past and all the military systems of the future and all the armies, navies and the air forces will become outmoded.

Admiral HAYWARD. But not free people, Mr. Mahon. They will not fade away.

Mr. MAHON. You just said that if the rest of the free world perished this country would perish.

Admiral HAYWARD. That is right.

Mr. MAHON. I have an optimism which apparently you do not share. This country, regardless of the obstacles and others who fall by the wayside, will never die.

Mr. FLOOD. You boys are both doing very well. All you needed was "hearts and flowers" soft music, offstage left.

The Admiral was directing himself, Mr. Chairman, to a series of interrogations from my friend dealing with hardware, $25 billions, and this concept of fortress America defense mechanism.

Mr. MINSHALL. I have no more questions, Mr. Chairman.

BASIC RESEARCH PROGRAM

Mr. THOMSON. How much of this budget is for basic research, out of the $971 million of obligational authority and $922 million of expenditures?

Admiral BENNETT. $49,250,000.

Mr. THOMSON. When the Air Force was before us the other day they had a basic research program. I am sure that the Army will have. We have it in other fields.

Admiral HAYWARD. I was particularly impressed with your statement that funds had gone down the drain. I suppose some of that is inevitable in basic research. But with all of these overlapping expenditures for basic research—and perhaps I should not say overlapping—but with the different budgets for basic research, what coordination do you have as far as being sure there is not overlapping and duplication?

Admiral BENNETT. If I may answer the question, the fundamental backstop against duplication lies in the character of the scientists themselves. A scientist who duplicates another's research effort never gets credit for it. That is the strongest motivation at the grass roots level for not duplicating.

Mr. THOMSON. Will they be working on the same thing?

Admiral BENNETT. They may be working on the same thing from parallel points of view. That is one of the ways you get research done.

To go back in the past, you have several methods of separating isotopes out to get material for the atomic bomb and nuclear power. It would have been wrong to say these were duplications. It would have been wrong to have stopped any one of them. Over and beyond the fundamentals there is a rather complete exchange of information on basic research problems between the three services, between the scientists themselves and the three services.

Mr. THOMSON. When a project comes in to you and is presented to you, do you check with any central agency to determine whether or not that is justified in view of the overall program for basic research?

Admiral BENNETT. In the course of time the coordinating committee on general sciences of the Office of the Secretary of Defense comes into this picture. This is both pre and post facto on the budget. This is the top mechanical, or mathematical coordinating point.

(Discussion off the record.)

Mr. THOMSON. You are not ready to talk in that area?

Admiral BENNETT. No.

Mr. THOMSON. Thank you.

POSSIBILITY OF SOVIET "LUNIK" BEING A HOAX

Mr. SIKES. Let me ask a question. The May issue of True magazine carried an article which states that the Russian lunik is a hoax. Do you have any opinion on that theory, Admiral Hayward?

Admiral HAYWARD. We got tracking signals from it, but whether it was a hoax or not I haven't read that story. I will have to read it. I do not know actually.

Admiral BENNETT. If I could interject a short comment. One of the troubles in determining exactly what the Russians do is they seldom communicate their frequency assignments to us. So while it is

possible, I think, to say there was a lunik, I am not sure that anyone can say precisely where it went or what it did. This may be the factual basis for the story which I have not read.

Mr. SIKES. The story insists the whole thing is a hoax. I take it that theory is not generally agreed to?

Admiral BENNETT. I would consider it a very dangerous assumption, that they were hoaxing us in this particular area.

Mr. SIKES. I think that it would be a dangerous assumption, too. That is all.

LACROSSE MISSILE

Mr. FLOOD. I have two questions. One will be to my Marine friend. I just want to know about this LACROSSE. When my grandfather left here with "Teddy" Roosevelt I'd believe the last thing they talked about was LACROSSE. What about this pigeon?

General SHELL. (Off the record.)

Mr. FLOOD. Do you believe it?

General SHELL. (Off the record.)

Mr. FLOOD. You still want it?

General SHELL. We still want it, that is, LACROSSE, model I.

V/STOL AIRCRAFT

Mr. FLOOD. Admiral Bennett, do you have anything in research and development, Navy, on a vertical takeoff, preferably a short runway takeoff airplane that will take 10 tons and land in a plowed field with 100 troops?

Admiral BENNETT. Not at 10 tons nor 100 troops.

Mr. FLOOD. Do you have it for 10 tons, bodies and hardware, up to a double platoon?

Admiral BENNETT. No, sir. There is nothing in the program that will approach that order of magnitude at the present time.

Mr. FLOOD. I asked the Army and they have nothing. I asked the Air Force and they have nothing. I have asked you and you have nothing. You do the Marines, and therefore the Marines have nothing. So, there is no such bird, no 10-ton aircraft to land troops or hardware in a plowed field for transport?

Admiral BENNETT. No, sir, not at those weights.

NUCLEAR-PROPELLED AIRCRAFT

Mr. BOYLE. At what page in your presentation can you direct me to the amount of money you requested for nuclear-propelled airplanes?

Admiral HAYWARD. That is under the Bureau of Aeronautics.

Mr. BOYLE. Will you supply that for the record?

Admiral HAYWARD. Yes. Pages 14, 15 and 16 of the project listings (projects NA 020024, NA 260001, and NA 435001).

Mr. BOYLE. Will you likewise supply the total amount of your request to the budget authorities

Admiral HAYWARD. Yes. The total requested was $4 million. Presently in the fiscal year 1960 program $2 million. Total expended fiscal year 1955–59 was $12.4 million.

Mr. BOYLE. Like my colleague, Melvin Price, of Illinois, I am very much concerned about the progress of the nuclear-propelled airplane. I do not feel that we should indulge in our sour grapes rationalization regarding our loss to the Russians on that bird at this time. Do you not feel in connection with your concept of Fortress America that there is a crying need for that piece of hardware?

Admiral HAYWARD. Mr. Boyle, it has great military potentials. From the Navy's requirements and point of view, we feel that we can get it out of a nuclear propulsion system of low power for seaplanes.

Mr. BOYLE. Tell me, is it a question of money? If you had more money, could you accelerate the program?

Admiral HAYWARD. Certainly, Mr. Boyle, we could accelerate the program, to a degree.

Mr. BOYLE. Is it your opinion that you want to give to the committee the impression that you do not feel that the amount involved is worth spending at this particular time?

Admiral HAYWARD. It is worth spending; yes.

Mr. BOYLE. Have you had any notion about the kind of money we are talking about?

Admiral HAYWARD. Yes. The national program we proposed to the Secretary of Defense to actually fly this aircraft, this seaplane that was given to us, was roughly $220 million. We would have it in the air in 1962 or 1963.

Mr. BOYLE. That might be the primary use of the bird, but it would not necessarily be the exclusive use. It would be available probably for other types of aircraft, would it not?

Admiral HAYWARD. That is correct. This would be nothing but a seaplane as an engine test bed to get a powerplant for the ultimate system. This is one way to get something in the air if the Joint Committee wanted to get it in the air from a psychological point of view.

Mr. BOYLE. And by that term you appreciate its terrific impact over the entire world?

Admiral HAYWARD. That is correct. We learned the hard way with the VANGUARD business and the IGY. It has the same application.

Mr. BOYLE. Let the record show at this point that I, for one, am very unhappy with the progress made in this area. It appears we are pennywise and pound foolish not to do something before the Soviets get a piece of this military hardware operational.

Mr. MAHON. I am afraid that we are not even pennywise.

Will you, in connection with responses to the questions by Mr. Boyle, give us a little summary of the funds expended, or obligated year by year, for the last 4 or 5 years or more, on nuclear propulsion?

(A classified statement was submitted.)

SUCCESSFUL POLARIS FIRING

Mr. THOMSON. I noticed in the paper a report of a successful firing of the POLARIS missile.

Admiral HAYWARD. Yes.

Mr. THOMSON. Can you tell us what type of test that was? Was it a full test?

Admiral HAYWARD. Everything worked. Let me say that Admiral Raborn is going around with a big smile on his face today.

Mr. MAHON. It was in the air about ———?

Admiral HAYWARD. Something like that.

POLARIS DEVELOPMENT

Mr. THOMSON. In POLARIS we did just exactly what you criticized; we developed the system before we really had a weapon.

Admiral HAYWARD. No, sir. This system originally, and under the time schedule, was to come in in 1963. We made some very good progress with components, the warheads, and the guidance. We took advantage of the THOR, and all the money that had gone into the other systems. There is not a component in the POLARIS system that is not within the state of the art.

Mr. THOMSON. Your statement does not apply to the POLARIS system then?

Admiral HAYWARD. Not in that particular case. The history of the POLARIS, of which I am sure Admiral Raborn told you, is that we started a long time ago. Now, if we had started to put the POLARIS in the *Nautilus* I would say that is exactly what we were doing.

Mr. THOMSON. I find it very difficult to reconcile this. POLARIS has never been tested unless it was tested yesterday. We are still going ahead with something we just sort of hope will work.

Admiral HAYWARD. No. The complete combination has not been tested, but the components, the inertial items, the solid propellant, the warhead, the nuclear-propulsion plant of the submarine—these have all been tested. The whole thing has not been tested.

Now comparisons may be odious, but there are other systems where you went to the system before you had done this. Now we have gained from the THOR experience and from the ATLAS experience. We got an awful lot from the Air Force and the Army and JUPITER.

Mr. THOMSON. You mentioned NIKE-ZEUS and BOMARC as being instances where we had gone off in the wrong direction.

Admiral HAYWARD. That is right.

Mr. THOMSON. Then you did say there was system after system which you thought cost the country millions. Are there any other system that we should consider dropping?

Admiral HAYWARD. Yes.

(Discussion off the record.)

Mr. FLOOD. What time period?

Admiral HAYWARD. 1965 to 1970.

Mr. FLOOD. It is before that. The ——— is before that.

Admiral HAYWARD. I bet you a hat again.

Mr. MAHON. The F–108 will probably come into the picture somewhere between 1960 and 1965.

Admiral HAYWARD. Off the record.

PACIFIC MISSILE RANGE

Mr. MAHON. The fiscal year 1960 Budget for continuing development of the Pacific missile range amounts to $126.2 million, of which $80.3 million is contained in this appropriation. Is there any plan to test the POLARIS missile at the Pacific Missile Range?

Captain WAGNER. There is no plan to test the POLARIS missile at the Pacific missile range at the present time. As POLARIS-equipped submarines become available in the Pacific in the future there probably will be some training firing in the Pacific missile range.

Mr. MAHON. What missiles do you expect to test here during fiscal year 1960?

Captain WAGNER. The following is a summary of training, R. & D. and technical evaluation operations to be conducted at the Pacific missile range during fiscal year 1960:

(A classified statement was submitted.)

Mr. MAHON. The Pacific missile range will be managed by the Navy in contrast with the Atlantic missile range, which is managed by Pan American Airways under a contract with the Air Force.

Since these facilities have similar functions the question arises as to why they are being managed differently. What reasons does the Navy have for believing "in house" management will be superior to contract management?

Captain WAGNER. The Pacific missile range differs from the Atlantic missile range in that, in addition to research and development firings, the Pacific missile range is required to perform training functions. With the introduction of militarily useful satellites, the Pacific missile range will become an operational facility in direct support of the fleets and the other military services. These functions require that overall management be military, backed up by civil service, for the following reasons: that the military keep abreast of accomplishments in the field; that certain new projects require top security restrictions which are more easily controlled by the military; national policy is involved in many aspects of range operations requiring direct communications and command. The nature of the Pacific missile range operation is such that it breaks down into several distinct ranges and operations or tasks, such as the Polar orbit range, IRBM range, ICBM range, communications coordination, tracking, sea recovery operations. Some of the aforementioned areas are well suited to contract operations and it is planned to employ contractors accordingly. In this way the Navy achieves the following advantages: Navy management stays abreast of accomplishments in the field; possible labor problems are limited to small parts of the overall range which would allow naval personnel to take over in a very short time if necessary in national emergency or militarily important operation; maximum security is assured; the military, generally, are trained in this new and rapidly developing field of operations.

Mr. MAHON. What is the extent of your deferred maintenance backlog at the Pacific missile range?

Captain WAGNER. $1,295,000.

Mr. MAHON. What are the major items in this backlog?

Captain WAGNER. The major items are as follows:

(*a*) Repair of 5-kilovolt primary line between operations building and wharf at San Nicolas Island	$74,000
(*b*) Overrun extension to southwest end of runway 321 at Point Mugu	65,000
(*c*) Repair of road at Point Mugu	104,700
(*d*) Repair of aircraft parking area at San Nicolas Island	93,700
(*e*) Repair of buildings at San Nicolas Island	64,400
(*f*) Repair of roads at San Clemente Island	70,000
(*g*) Repair of runway 321 at Point Mugu	60,000
(*h*) Repair of barracks floors, at Point Mugu	60,000

The remainder of the $1,295,000 is composed of numerous smaller items similar to those mentioned above.

NEW TURBOPROP AIRCRAFT

Mr. MAHON. Admiral, you are developing a new turboprop aircraft for operation from carriers. How heavy is this plane likely to be and what carriers will be able to use it?

Admiral HAYWARD. Yes, the W2F–1 powered by two Allison T–56–A–8 turboprop engines. It will weight about 50,000 pounds and will be able to operate from all modernized *Essex* and subsequent class carriers.

Mr. MAHON. Admiral, how good is the ASROC weapon and about when will this weapon be ready for assignment to the fleet?

Admiral HAYWARD. Off the record.

(Discussion off the record.)

Mr. MAHON. Admiral Hayward, you refer to a helicopter mine countermeasures system. What is this and how will it work?

Admiral HAYWARD. Off the record.

(Discussion off the record.)

OPERATION AND MAINTENANCE COSTS

Mr. MAHON. Admiral, will you supply for the record a breakdown of O. & M. costs paid from the Navy RDT & E appropriation?

Admiral BENNETT. The information requested follows:

Operation and maintenance costs paid from the appropriation "Research, development, test, and evaluation, Navy"

[In thousands of dollars]

	Fiscal year 1959			Fiscal year 1960			Fiscal year 1961		
	R. & D.	T. & E.	Total	R. & D.	T. & E.	Total	R. & D.	T. & E.	Total
Office of Naval Research	16,698	.....	16,698	18,938	.....	18,938	18,907	.....	18,907
Bureau of Aeronautics	30,208	.....	30,208	34,669	.....	34,669	37,905	.....	37,905
Bureau of Ships	14,736	3,406	18,142	16,279	4,870	21,149	16,131	4,945	21,076
Bureau of Ordnance	22,975	4,986	27,961	25,000	5,340	30,340	25,000	5,093	30,093
Bureau of Medicine and Surgery	536	.....	536	562	.....	562	654	.....	654
Bureau of Yards and Docks	2,102	.....	2,102	2,310	.....	2,310	2,310	.....	2,310
Total	87,255	8,392	95,647	97,758	10,210	107,968	100,907	10,038	110,945

Mr. MAHON. The Navy, like the other services, is shifting rapidly to nuclear weapons. What effect, or perhaps I should say, how much will these weapons contribute to the poisoning of the earth's atmosphere, should they be used to any extent in warfare?

Admiral HAYWARD. This is a pretty loaded question, and one for which the answers are probably not at all well known for all conditions of weapons employment because of the many variables which must be considered. I think, however, that at least in the area of antisubmarine warfare nuclear weapons, I can give you a good definitive answer. If the antisubmarine warfare nuclear weapon, either depth charge, torpedo, or otherwise, is burst at a depth below the surface greater than the bubble radius, there will be no significant contribution to atmospheric contamination. Under these conditions of nuclear explosion the radioactive debris is almost wholly trapped within water plume, and is rapidly returned to the water's surface as the plume subsides and the base surge dissipates. The fission fragments being carried back to the water's surface soon diffuse through the water by a mixing process and within a short period of time do not constitute a radiation hazard even within the immediate burst vicinity. As a matter of interest, the only reliable means of identifying the nuclear character of an underwater explosion is through sampling the water in the suspected area of detonation and this sample must be taken within a matter of hours after the event to be conclusive.

Since the design characteristics of our nuclear antisubmarine warfare weapons are such that the burst depth will be greater than a bubble radius, the use of such weapons will not contribute to poisoning of the atmosphere.

For weapons burst on or over the land surface the answers cannot be so readily defined because of a number of variables. If the weapon is wholly an air burst there is essentially no localized contamination and the entire yield contributes to atmospheric contamination or poisoning. If the weapon is a surface burst a good portion of the bomb debris contributes to intensified localized fallout and the remainder contributes to worldwide atmospheric contamination. For weapons detonated in the region between a true air burst and a true surface burst varying amounts of the debris contribute to localized fallout. Since it is impossible to predict how many weapons will actually be surface burst, how many air burst, and how many in between, the percentage of activity which contributes to local fallout or to worldwide contamination cannot be known with accuracy.

As you know, the principal atmospheric poisoning agents are strontium 90 and cesium 137 which are products of fission and carbon 14 which is produced by neutron capture in atmospheric nitrogen and is produced in both the fission and fusion processes. All three of these radioactive isotopes are long half-lived. Virtually all of the carbon 14 remains airborne and the greatest percentage of both strontium and cesium even for true surface bursts find their way into the atmosphere since they pass through an inert gas stage in formation.

Lumping thermonuclear weapons with fission weapons to obtain an average figure, I can reasonably estimate that for each kiloton of yield the radioactivity added to atmospheric contamination will be

20 curies of carbon 14, 100 curies of strontium 90 and 200 curies of cesium 137. The significance of these figures depends upon many factors, most important of which are the total yield employed, the distribution of particles throughout the atmosphere, the rate of world-wide fallout, and human tolerance for each element. There is still a good deal of controversy over the last three of these factors and the first will be governed by the combat situation encountered.

EVALUATION OF BASIC RESEARCH PROGRAMS

Mr. MAHON. Admiral, will you tell us the criteria for evaluating basic research programs?

Admiral BENNETT. There are no general criteria or fixed standards for judging when a research project or program has become unproductive. Usually any such decision is a professional evaluation made jointly by the Navy scientist who is the project officer and the investigator himself who is often the first to realize that his line of research is not sufficiently promising.

The Navy scientific personnel, who are not only highly competent in their individual scientific fields but also have years of experience as science administrators, monitor all research contracts closely. Both they and the scientific staff of Navy's field offices make periodic visits to all research projects. Since the prestige and scientific reputation of both Navy and the individual investigator depend on conducting research that is productive, both are equally unwilling to continue a project which, after a reasonable period of time that depends on the scientific field concerned, is not turning up significant new knowledge. In addition, the Navy project officer is not anxious to tie up his limited funds in work that is not leading anywhere. In such cases either the contract is not continued or the Navy and the investigator mutually agree to try a new or different approach that promises to be more fruitful.

The unproductive basic research contract is not a major problem in the Navy research program due to the great care in selecting research projects for support in the first place.

RESEARCH OUTSIDE OF UNITED STATES

Mr. MAHON. Admiral, will you submit for the record the individuals or institutions outside the United States which have R. & D. contracts? Include both fiscal year 1958 and 1959.

Admiral BENNETT. The information requested is as follows:

NAVY RESEARCH AND DEVELOPMENT CONTRACTS WITH INDIVIDUALS OR INSTITUTIONS OUTSIDE THE UNITED STATES

FISCAL YEAR 1958

Antoine e Rinaldo Dohrn, Naples, Italy
Dr., Ernest Lumcke Institute, Berlin Germany
Compagnie Generale de Telegraphie Sans Fil, Paris, France
Fulmer Research Institute, Ltd., Stokes-Pages, England
Hamburg University, Hamburg Germany
Hamburgische Schiffban-Versuchanstalt, Hamburg, Germany
Jacques Piccard, Lausanne, Switzerland
Laboratoire Central d'Electricite, Brussels, Belgium
Sanders Roc, Ltd., London England
Technische Hochschule, Munich, Germany
Mr. C. Wigley, London, England

NAVY RESEARCH AND DEVELOPMENT CONTRACTS WITH INDIVIDUALS OR INSTITUTIONS OUTSIDE THE UNITED STATES

FISCAL YEAR 1959

Dr. Ernest Lubcke Institute, Berlin, Germany
Fulmer Research Institute, Ltd., Stokes-Pages, England
General Electric, Ltd. of England, London, England
Laboratoire Central d'Electricite, Brussels, Belgium
Manchester University, Manchester, England
N. Minorsky, Aix-en-Provence, France
Sanders Roc, Ltd., London, England
Mr. C. Wigley, London, England

PENDING CONTRACTS

Compagnie General de Telegraphie Sans Fil, Paris, France
Hamburgische Schiffban-Versuchsanstalt, Hamburg, Germany
Hebrew University, Jerusalem, Israel
Hydro-og Aerodynamisk Lab, Lyngby, Denmark
Institute for Schiffban, der Universtat Hamburg, Hamburg, Germany
Laboratoire de Physiologic Acoustique, Juoy-en-Josas, France
Max Planck Institute, Gottingen, Germany
Technische Hochschule, Munich, Germany
University of Stockholm, Stockholm, Sweden
Versuchsanstalt fur Wasserban und Schiffban, Berlin, Germany

COLLEGES AND UNIVERSITIES DOING NAVY RESEARCH

Mr. MAHON. Will you submit for the record a list of universities, colleges and nonprofit institutions conducting R. & D. under contract with ONR?

Admiral BENNETT. The information requested follows:

LIST OF UNIVERSITIES, COLLEGES, AND NONPROFIT INSTITUTIONS CONDUCTING RESEARCH AND DEVELOPMENT UNDER CONTRACT WITH THE OFFICE OF NAVAL RESEARCH

Air Force Cambridge Research Center, Cambridge, Mass.
Akron, University of Akron, Ohio.
Alabama, University of, Birmingham, Ala.
Alaska, University of, College, Alaska
Alfred University, Alfred, N.Y.
Allegheny General Hospital, Pittsburgh, Pa.
American Foundation for Biological Research, Madison, Wis.
American Geographic Society, New York, N.Y.
American Institute of Biological Sciences, Washington, D.C.
American Institute for Research, Pittsburgh, Pa.
American Museum of Natural History, New York, N.Y.
American Society of Mechanical Engineers, New York, N.Y.
American Type Cultural Collection, Washington, D.C.
Amherst College, Amherst, Mass.
Arctic Institute of North America, New York, N.Y.
Arizona State College, Flagstaff, Ariz.
Arizona, University of, Tucson, Ariz.
Armour Research Foundation, Chicago, Ill.
Battelle Memorial Institute, Columbus, Ohio.
Bethany College, Bethany, W. Va.
Boston University, Boston, Mass.
Brandeis University, Waltham, Mass.
Brooklyn Polytechnic Institute, Brooklyn, N.Y.
Brown University, Providence, R.I.
Bryn Mawr Hospital, Bryn Mawr, Pa.
Buffalo University of, Buffalo, N.Y.
California Institute of Technology, Pasadena, Calif.
California, University of, Berkeley, Calif.
California, University of, Los Angeles, Calif.
Calvin College, Grand Rapids, Mich.
Carnegie Institute of Technology, Pittsburgh, Pa.
Carroll, John, University, Cleveland, Ohio
Case Institute of Technology, Cleveland, Ohio
Catholic University, Washington, D.C.
Central Institute for the Deaf, St. Louis, Mo.

List of Universities, Colleges, and Nonprofit Institutions Conducting Research and Development Under Contract With the Office of Naval Research—Continued

Chicago Medical School, Chicago, Ill.
Chicago, University of, Chicago, Ill.
Cincinnati, University of, Cincinnati, Ohio
College of Charleston, Charleston, S.C.
Colorado Agricultural and Mining College, Fort Collins, Colo.
Colorado School of Mines, Golden, Colo.
Colorado, University of, Boulder, Colo.
Columbia University, New York, N.Y.
Connecticut College, New London, Conn.
Connecticut, University of, Storrs, Conn.
Cornell Aeronautical Laboratory, Buffalo, N.Y.
Cornell University, Ithaca, N.Y.
Delaware, University of, Newark, Del.
Denver, University of, Denver, Colo.
Detroit, University of, Detroit, Mich.
Drexel Institute of Technology, Philadelphia, Pa.
Duke University, Durham, N.C.
Einstein, Albert, College of Medicine, Bronx, N.Y.
Emory University, Emory, Ga.
Evangelist College of Medicine, Los Angeles, Calif.
Florida State University, Tallahassee, Fla.
Florida, University of, Gainesville, Fla.
Ford Institute of Medical Research, Detroit, Mich.
Fordham University, New York, N.Y.
Franklin Institute, Philadelphia, Pa.
George Washington University, Washington, D.C.
Georgetown University, Washington, D.C.
Georgia Institute of Technology, Atlanta, Ga.
Hahnemann Medical College, Philadelphia, Pa.
Hancock Foundation, Fullerton, Calif.
Harvard University, Cambridge, Mass.
Haverford College, Haverford, Pa.
Hawaii University, Honolulu, T.H.
Hofstra College, Hempstead, Long Island, N.Y.
Hope Medical Center, Duarte, Calif.
Houston University, Houston, Tex.
Huntington Memorial Hospital, Pasadena, Calif.
Illinois Institute of Technology, Chicago, Ill.
Illinois, University of, Urbana, Ill.
Indiana University, Bloomington, Ind.
Institute for Advanced Study, Princeton, N.J.
Institute for Cancer Research, Philadelphia, Pa.
Institute of Gas Technology, Chicago, Ill.
Iowa State College, Ames, Iowa.
Iowa State, University of, Iowa City, Iowa.
Jefferson Medical College, Philadelphia, Pa.
Jewish Hospital of Brooklyn, Brooklyn, N.Y.
Johns Hopkins University, Baltimore, Md.
Kansas State College, Manhattan, Kans.
Kansas, University of, Lawrence, Kans.
Kresge Eye Institute, Detroit, Mich.
Lankeneau Institute for Cancer Research, Philadelphia, Pa.
Lehigh University, Bethlehem, Pa.
Linfield Research Institute, McMinnville, Oreg.
Louisiana State University, Baton Rouge, La.
Loyola University, Chicago, Ill.
Maine, University of, Orono, Maine.
Marine Biological Laboratory, Woods Hole, Mass.
Maryland, University of, College Park, Md.
Massachusetts Eye and Ear Infirmary, Boston, Mass.
Massachusetts Institute of Technology, Cambridge, Mass.
Massachusetts, University of, Amherst, Mass.
Medical College of Virginia, Richmond, Va.
Medical College of South Carolina, Charleston, S.C.
Mellon Institute, Pittsburgh, Pa.
Miami, University of, Coral Gables, Fla.
Michigan State University, East Lansing, Mich.
Michigan, University of, Ann Arbor, Mich.
Middle Tennessee State College, Murfreesboro, Tenn.
Minnesota, University of, Minneapolis, Minn.
Mississippi College, Clinton, Miss.
Mississippi, University of, Jackson, Miss.
Missouri, University of, Columbia, Mo.
Montana State College, Bozeman, Mont.
Mount Holyoke College, South Hadley, Mass.
Nantucket Maria Mitchell Association, Nantucket, Mass.
National Academy of Sciences, Washington, D.C.
National Research Council, Washington, D.C.

LIST OF UNIVERSITIES, COLLEGES, AND NONPROFIT INSTITUTIONS CONDUCTING RESEARCH AND DEVELOPMENT UNDER CONTRACT WITH THE OFFICE OF NAVAL RESEARCH—Continued

Nebraska, University of, Lincoln Neb.
New Mexico College of Agriculture and Mechanic Arts, State College, N.Mex.
New Mexico Highlands University, Las Vegas, N. Mex.
New Mexico School of Mines, Socorro, N. Mex.
New York City College, New York, N.Y.
New York State Psychiatric Institute, New York, N.Y.
New York, University of, New York, N.Y.
New York State, University of, Albany, N.Y.
New York Zoological Society, New York, N.Y.
North Carolina State College, Raleigh, N.C.
North Carolina, University of Chapel Hill, N.C.
North Dakota, University of, Grand Forks, N.D.
Northwestern University, Evanston, Ill.
Notre Dame, University of, Notre Dame, Ind.
Occidental College, Los Angeles, Calif.
Ohio State University, Columbus, Ohio
Oklahoma, University of, Norman, Okla.
Oregon State College, Corvallis, Oreg.
Oregon, University of, Portland, Oreg.
Pennsylvania State University, State College, Pa.
Pennsylvania, University of, Philadelphia, Pa.
Physicians and Surgeons, College of, San Francisco, Calif.
Pittsburgh, University of, Pittsburgh, Pa.
Pomona College, Claremont, Calif.
Portland State College, Portland, Oreg.
Princeton University, Princeton, N.J.
Psychological Research Association, Washington, D.C.
Puerto Rico, University of, San Juan, P.R.
Purdue University, Purdue, Ind.
Rensselaer Polytechnic Institute, Troy, N.Y.
Rheumatic Fever Research Institute, Chicago, Ill.
Rhode Island, University of, Kingston, R.I.
Rice Institute, Houston, Tex.
Rochester, University of, Rochester, N.Y.
Rockefeller Institute for Medical Research, New York, N.Y.
Rutgers University, New Brunswick, N.J.
Sacramento State College, Sacramento, Calif.
San Diego State College, San Diego, Calif.
Seneca College, Geneva, N.Y.
Sinai Hospital of Baltimore, Baltimore, Md.
Smithsonian Institute, Washington, D.C.
Smythe Research Institute, San Diego, Calif.
Southern California, University of, Los Angeles, Calif.
St. Johns University, Jamaica, N.Y.
St. Louis University, St. Louis, Mo.
St. Lukes Hospital, New York, N.Y.
Stanford Research Institute, Menlo Park, Calif.
Stanford University, Palo Alto, Calif.
Stevens Institute of Technology, Hoboken, N.J.
Syracuse University, Syracuse, N.Y.
Temple University, Philadelphia, Pa.
Tennessee, University of, Memphis, Tenn.
Texas Agricultural and Mining College, College Station, Tex.
Texas, University of, Austin, Tex.
Toronto, University of, Toronto, Canada
Tufts College, Medford, Mass.
Tulane University, New Orleans, La.
Utah, University of, Salt Lake City, Utah
Vanderbilt University, Nashville, Tenn.
Vermont, University of, Burlington, Vt.
Virginia, University of, Charlottesville, Va.
Washburn University, Topeka, Kans.
Washington State College, Pullman, Wash.
Washington University, St. Louis, Mo.
Washington, University of, Seattle, Wash.
Wayne State University, Detroit, Mich.
Western Reserve University, Cleveland, Ohio
Wichita, University of, Wichita, Kans.
Wisconsin, University of, Madison, Wis.
Woods Hole Oceanographic Institute, Woods Hole, Mass.
Yale University, New Haven, Conn.
Yeshiva University, New York, N.Y.

Mr. MAHON. Will you also submit for the record the institutions which have finished their projects or terminated their contracts?

Admiral BENNETT. The information requested follows:

INSTITUTIONS WHICH HAVE FINISHED THEIR PROJECTS OR TERMINATED THEIR CONTRACTS

American Association of Star Observers, Cambridge, Mass.
American Math Society, Providence, R.I.
Children's Hospital, Philadelphia, Pa.
Dartmouth College, Hanover, N.H.
Grinnell College, Grinnell, Iowa
Howard University, Washington, D.C.
International Research Association, New York, N.Y.
Massachusetts General Hospital, Boston, Mass.
Massachusetts Memorial Hospital, Boston, Mass.
New Hampshire, University of, Durham, N.H.
Northeastern University, Boston, Mass.
Redlands, University of, Redlands, Calif.
Wake Forest College, Wake Forest, N.C.

TOTAL RESEARCH AT COLLEGES AND UNIVERSITIES

Mr. MAHON. How much of the money in basic research in fiscal year 1959 and requested in fiscal year 1960 has been or will be assigned for accomplishment at colleges and universities?

Admiral BENNETT. The information is as follows:

	Fiscal year 1959	Fiscal year 1960
Total basic research included in R.D.T. & E.N. estimates	$47,537,000	$49,250,000
Basic research included in above total being conducted at colleges and universities	26,760,000	26,688,000

VERTICAL TAKEOFF AND LANDING AIRCRAFT

Mr. MAHON. Admiral, please submit for the record a breakdown of funds obligated in both in VTOL (vertical takeoff and landing) and STOL (short takeoff and landing) aircraft and related equipment programs. Show the significant advances made during the past year and your future programs in these areas.

Admiral HAYWARD. The information requested is as follows:

1. Approximately $1,210,000 of Navy funds will be obligated for development in connection with VTOL and STOL aircraft.

2. During the past 5 years approximately $9,800,000 Navy funds have been spent in the VTOL and STOL technical area.

3. Significant advances in the past year include—

(*a*) The successful transition from hovering to the forward flight and return to hovering of the Vertol 76 tilt-wing VTOL aircraft.

(*b*) The completion of full-scale wind tunnel tests on the Ryan model 92 and the initiation of flight testing toward transition of the deflected slipstream aircraft.

(*c*) The completion of the full-scale Aerodynewingless aircraft and the initiation of full-scale wind tunnel tests in the 40- by 80-foot tunnel at Ames Research Center, Moffett Field, Calif.

(*d*) The collection and dissemination of information from numerous technical reports of exploratory research to industry and other Government agencies.

4. The Navy has under development the Kaman 16–B, a combination tilt-wing deflected slipstream configuration, installed on an existing seaplane hull. This aircraft is a low-subsonic VTOL amphibian designed to investigate the characteristics of the tilt-wing and deflected slipstream combination on a full-scale research aircraft. The Navy in conjunction with the Air Force has jointly sponsored the Bell VTOL aircraft which has been financed through preliminary design, wind tunnel tests and mockup. There are no firm plans for funding this design beyond mockup. The design of a transport VTOL type aircraft to carry assault troops during limited warfare operations will be initiated. Performance characteristics will be determined after evaluation of design proposals.

5. This will be entirely dependent on the progress of the research and development programs being conducted by the Defense Department. When the state-of-the-art reaches the point that operational requirements as set forth by CNO

can be met—then 3–4 years later an operational aircraft is expected to be available. No supersonic or high performance VTOL or STOL aircraft is currently under development by the Navy.

6. The Navy feels that under the broad scope of overall R. & D. requirements in the aircraft field the present emphasis on this program is consistent with our future plans. Research in the VTOL/STOL area is proceeding in the normal stepwise manner and advances in technology when achieved will be applied as appropriate to naval aircraft designs.

Mr. MAHON. We thank you very much for your stimulating testimony and your ideas. We are always glad to see people with ideas and who are not afraid to express them.

TUESDAY, APRIL 21, 1959.

RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, ARMY

WITNESSES

LT. GEN. ARTHUR G. TRUDEAU, CHIEF OF RESEARCH AND DEVELOPMENT
MAJ. GEN. ROBERT J. WOOD, DEPUTY CHIEF OF RESEARCH AND DEVELOPMENT
MAJ. GEN. WILLIAM W. DICK, JR., OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT
MAJ. GEN. DAVID W. TRAUB, DIRECTOR OF ARMY BUDGET, OFFICE OF THE COMPTROLLER OF THE ARMY
MAJ. GEN. ROBERT S. MOORE, SPECIAL ASSISTANT TO ASSISTANT SECRETARY OF DEFENSE (COMPTROLLER)
BRIG. GEN. FRANK H. BRITTON, OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT
BRIG. GEN. JEAN E. ENGLER, OFFICE OF THE DEPUTY CHIEF OF STAFF FOR LOGISTICS
BRIG. GEN. L. J. LINCOLN, OFFICE OF THE DEPUTY CHIEF OF STAFF FOR LOGISTICS
COL. ROBERT E. KIMBALL, OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT
COL. HENRY M. SPENGLER, OFFICE OF THE DEPUTY CHIEF OF STAFF FOR MILITARY OPERATIONS
C. R. WOODSIDE, OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT

Program and financing

	1958 actual	1959 estimate	1960 estimate
Program by activities:			
Direct obligations:			
1. Military sciences	$124,020,866	$132,274,000	$117,174,000
2. Aircraft and related equipment	59,954,381	30,314,005	24,101,000
3. Missiles and related equipment	321,066,326	454,681,750	543,330,000
5. Ships and small craft and related equipment	424,816	334,000	170,000
6. Ordnance, combat vehicles, and related equipment	96,182,484	89,733,785	124,414,000
Combat and support vehicles and related equipment	(34,251,843)	(27,885,600)	(44,597,000)
Artillery and other weapons and related equipment	(18,447,005)	(18,240,000)	(31,724,000)
Ammunition and related equipment	(43,483,636)	(43,608,185)	(48,093,000)
7. Other equipment	143,986,409	177,253,210	177,485,000
8. Programwide management and support	55,067,183	63,736,000	59,841,000
Total direct obligations	801,282,465	948,326,750	1,046,515,000

Program and financing—Continued

	1958 actual	1959 estimate	1960 estimate
Program by activities—Continued			
Reimbursable obligations:			
1. Military sciences	$642,478	$460,000	$450,000
2. Aircraft and related equipment	102,000	50,000	50,000
3. Missiles and related equipment	11,625,548	59,120,000	50,300,000
6. Ordnance, combat vehicles, and related equipment	116,000	50,000	50,000
Combat and support vehicles and related equipment	(49,000)		
Ammunition and related equipment	(67,000)	(50,000)	(50,000)
7. Other equipment	918,547	1,096,000	1,150,000
8. Programwide management and support	60,600	44,000	1,500,000
Total reimbursable obligations	13,465,173	60,820,000	53,500,000
Total obligations	814,747,638	1,009,146,750	1,100,015,000
Financing:			
Comparative transfers from (−) other accounts	−308,906,730	−393,913,000	
Unobligated balance brought forward	−33,828,114	−55,180,525	−25,345,525
Unobligated balance transferred from "Procurement of equipment and missiles, Army" (1960 appropriation act)			−10,000,000
Advances and reimbursements from—			
Other accounts	−21,001,770	−52,906,000	−53,360,000
Non-Federal sources (5 U.S.C. 172d)	−283,405	−94,000	−140,000
Unobligated balance carried forward	55,180,525	25,345,525	35,345,525
New obligational authority	505,908,144	532,398,750	1,046,515,000
New obligational authority:			
Appropriation	405,045,000	498,700,000	1,046,515,000
Transferred from—			
"Emergency fund, Department of Defense" (71 Stat. 313; 72 Stat. 713)	82,111,000	13,177,000	
"Salaries and expenses, Advanced Research Projects Agency, Department of Defense" (72 Stat. 712)		15,500,000	
"Military personnel, Army" (72 Stat. 7)	20,000,000		
Transferred to—			
"Expenses," Airways Modernization Board (31 U.S.C. 581c)	−1,247,856		
"Research and development," National Aeronautics and Space Administration (72 Stat. 433)		−4,078,250	
Appropriation (adjusted)	505,908,144	523,298,750	1,046,515,000
Proposed supplemental due to pay increases		9,100,000	

Object classification

	1958 actual	1959 estimate	1960 estimate
RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, ARMY			
Total number of permanent positions	16,583	17,788	19,630
Full-time equivalent of all other positions	62	31	25
Average number of all employees	15,808	17,211	18,958
Number of employees at end of year	16,797	17,882	19,369
Average GS grade and salary	8.1 $6,061	8.1 $6,622	8.2 $6,616
Average salary of ungraded positions	$4,962	$5,461	$5,461
Personal service obligations:			
Permanent positions	$92,672,935	$108,406,510	$121,233,000
Positions other than permanent	319,670	206,650	191,450
Other personal services	6,698,286	8,962,540	9,457,550
Total personal service obligations	99,690,891	117,575,700	130,882,000

Object classification—Continued

	1958 actual	1959 estimate	1960 estimate
RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, ARMY—continued			
Direct obligations:			
01 Personal services	$97,498,882	$106,900,700	$119,887,600
02 Travel	4,625,883	4,975,900	5,066,643
03 Transportation of things	2,211,394	1,527,700	1,578,453
04 Communication services	155,957	172,800	177,246
05 Rents and utility services	940,328	967,200	1,014,418
06 Printing and reproduction	12,983	13,200	13,076
07 Other contractual services	271,495,901	320,699,105	334,561,230
Services performed by other agencies	41,265,281	47,474,000	44,356,000
08 Supplies and materials	66,660,672	73,232,900	57,227,888
09 Equipment	305,491,023	383,768,800	476,682,086
10 Lands and structures	419,004	416,900	355,800
11 Grants, subsidies, and contributions	4,591,177	5,320,500	5,458,151
13 Refunds, awards, and indemnities	53,609	55,700	51,401
15 Taxes and assessments	83,119	82,300	83,008
16 Investments and loans	2,073	2,000	2,000
Total direct obligations	795,507,286	945,609,705	1,046,515,000
Reimbursable obligations:			
01 Personal services	2,192,009	10,675,000	10,994,400
02 Travel	133,062	350,000	360,500
03 Transportation of things	1,094	1,800	2,900
04 Communication services		15,200	16,000
05 Rents and utility services		56,200	45,000
07 Other contractual services	9,268,500	46,363,100	38,373,500
08 Supplies and materials	1,813,491	3,290,700	3,641,200
09 Equipment	43,755	45,800	52,900
11 Grants, subsidies, and contributions	13,002	13,200	13,600
13 Refunds, awards, and indemnities	134		
15 Taxes and assessments	126		
Total reimbursable obligations	13,465,173	60,820,000	53,500,000
Total, Army	808,972,459	1,006,429,705	1,100,015,000
ALLOCATION ACCOUNTS			
Total number of permanent positions	8	1	
Average number of all employees	79	15	
Number of employees at end of year	88	0	
Average GS grade and salary	7.1 $4,890	7.1 $5,130	
01 Personal services:			
Permanent positions	$40,013	$7,863	
Other personal services	374,376	74,555	
Total personal services	414,389	82,418	
02 Travel	8,735	175	
03 Transportation of things	2,608		
04 Communication services	2,353		
05 Rents and utility services	11,327		
06 Printing and reproduction	183		
07 Other contractual services	5,075,324	2,271,200	
Services performed by other agencies	179		
08 Supplies and materials	25,806	5,381	
09 Equipment	25,179	500	
10 Lands and structures	184,382	352,525	
11 Grants, subsidies, and contributions	23,819	4,846	
13 Refunds, awards, and indemnities	645		
15 Taxes and assessments	250		
Total, allocation accounts	5,775,179	2,717,045	
Total obligations	814,747,638	1,009,146,750	1,100,015,000
Obligations are distributed as follows:			
Army	808,972,459	1,006,429,705	1,100,015,000
Department of Agriculture	1,507		
Air Force	25		
Atomic Energy Commission	5,181,076	2,623,526	
Department of Commerce	543,010	84,068	
Department of the Interior	22,441	340	
Navy	26,931		
Veterans' Administration	189	9,111	

Obligations by Program

We shall insert at this point the table showing the obligations by program.

(The matter referred to follows:)

Obligations by program—Research, development, test and evaluation, Army

No.		Actual, fiscal year 1958	Estimate, fiscal year 1959	Actual, as of Dec. 31, 1958	Estimate, fiscal year 1960
5000	Military sciences	$92,843,791	$97,153,000	$59,666,850	$89,734,000
5100	Aircraft and related equipment	59,954,381	30,314,005	7,311,500	24,101,000
5200	Missiles and related equipment	321,066,326	454,681,750	127,967,100	543,330,000
5300	Ships and small craft and related equipment	424,816	334,000	119,200	170,000
5500	Ordnance, combat vehicles and related equipment	96,182,484	89,733,785	37,515,000	124,414,000
5600	Other equipment	121,551,171	142,376,210	31,417,300	144,308,000
5700	Programwide management and support	55,647,183	63,736,000	48,108,200	59,841,000
	Total Army	747,670,152	878,328,750	312,105,150	985,898,000
5000	Military sciences (Armed Forces special weapons project)	31,177,075	35,121,000	11,353,400	27,440,000
5600	Other equipment (Department of Defense classified activity)	22,435,238	34,877,000	6,489,850	33,177,000
	Total, Department of Defense	53,612,313	69,998,000	17,843,250	60,617,000
	Total direct obligations	801,282,465	948,326,750	329,948,400	1,046,515,000
	Note.—The obligations through December 31 shown above include reimbursements; conversely, the annual estimates for all 3 years exclude reimbursements. The tabulation below presents the statement on a more comparable basis at the program level.				
	Total as shown above	801,282,465	948,326,750	329,948,400	1,046,515,000
	Reimbursements	13,465,173	60,820,000		53,500,000
	Total research, development, test and evaluation, Army	814,747,638	1,009,146,750	329,948,400	1,100,015,000

Mr. Mahon. We will now proceed to a consideration of the research, development, test, and evaluation portion of the budget for the Army.

Mr. Mahon. We have before us Lieutenant General Trudeau.

General, when were you last before the committee?

General Trudeau. It must have been in 1955, when I was Chief of Army Intelligence.

Mr. Mahon. How many stars did you have then?

General Trudeau. Two.

Mr. Mahon. I knew you when you had fewer stars than two.

General Trudeau. That is right.

Mr. Mahon. When did you first appear before the Appropriations Committee?

General Trudeau. In 1947, when I was Assistant Director of Personnel for the Army.

Mr. Mahon. What have you been doing since then?

General Trudeau. I left the War Department in 1947, if that is far enough back. I proceeded to Germany, where I commanded the 1st Constabulary Brigade for 2 years.

In 1950 I was ordered back with the reestablishment of the Army War College to be the first deputy commandant.

In 1952 I went to Japan, where I was first the assistant division commander, and later division commander of the 1st Cavalry Division, and then I moved on to Korea in early 1953 as commander of the 7th Infantry Division. I came back as Assistant Chief of Staff for Intelligence for 2 years. I returned to the Far East as Deputy Chief of Staff, Plans, Far East and United Nations Command. Then back to Korea again as the corps commander for 16 months and a little over a year ago, the 1st of April of last year, I took over my present assignment as Chief of Research and Development.

Mr. MAHON. I believe that a very well known man had the position that you now hold.

General TRUDEAU. A very good friend of mine.

Mr. MAHON. You may proceed with your statement.

General TRUDEAU. Thank you, sir.

STATEMENT OF CHIEF OF RESEARCH AND DEVELOPMENT

General TRUDEAU. Mr. Chairman and members of the committee, I am Lt. Gen. Arthur G. Trudeau, Chief of Army Research and Development. I would like to outline for you this morning the Army's research and development program and to place it in proper perspective with respect to the missions assigned to the U.S. Army.

OBJECTIVE

In general, Army research and development has the objective of providing the most modern and effective weapons and equipment to meet the needs of the Army. This objective is accomplished first by designing future weapons systems and materiel to support our latest concepts of organizations and tactics, to be superior to known and predicted enemy capabilities, to incorporate our newest scientific and technological advances. Then we must be able to integrate our weapons, organizations, and missions to evaluate their effectiveness to achieve our predicted combat objectives.

The result must be to equip a continuing effective fighting force to meet any future enemy threats or any type or shade of war from police actions and so-called limited wars to the general type of conflict that would spare no nation, no continent, from the horrors of a nuclear conflict.

PROBABILITY OF RECURRENCE OF LIMITED WAR

I will not attempt to outline and define for you the types of conflicts for which we have designed our national strategy and, in turn, that of the free world. I am sure you are well informed in this field, but I would like to emphasize the probability of recurrence of limited war. This would involve conventional land forces backed up by the necessary air and naval power. These would be capable of utilizing tactical atomic weapons if authorized. Other testimony to the Congress has listed 18 small wars since World War II. I think that Korea was at least a limited war, limited to a geographical environment and limited to major land operations and objectives, as more than 100,000 of my Army comrades proved when they shed their blood on those for-

bidding Korean hills and in the rice paddies. That was certainly a measure of our determination to repulse aggression, to remain free, and meet the Communist challenge on the battlefield of their own choosing and that same determination must be nurtured as a basic ingredient of our policy today.

Today, and in the future, we must either be prepared to defend ourselves adequately—on any battlefield, on any scale of war—or be willing to accept the consequences. That is the national challenge which we must accept and be able to recognize and resist in any of its insidious forms if our Nation is to survive.

The Communist intention is very clearly stated in their own words—and that is to destroy us. As a longtime student of communism I cannot be deterred from that conclusion by honeyed words from the Kremlin. Yet there is still that segment of our population who would try to tell us otherwise, who through ignorance or intent would try to lull us to sleep, and suggest that we lie down as the lamb with the wolf and expect to wake up in the morning. This is the kind of cohabitation, called peaceful coexistence, that is undermining our national will and readiness to meet the challenge. This is the kind of peaceful coexistence that the growing Russian bear advocates as he sits with you on an ice-floe, while his pangs of hunger become uncontrollable as twilight approaches.

This is the way the Army views our present tenuous situation and in Army research and development we feel strongly that part of the counteraction requires a vigorous research and development program to provide better and more effective weapons and materiel. The Army, more than any other service, may find itself extended and probably overextended in both the general and limited types of war because of the great preponderance of land power and manpower arrayed against us. We must make every possible provision in our power to recognize such conditions and make the Army an effective fighting force for land combat.

DEVELOPMENT OF EQUIPMENT FOR GROUND ARMY

As the Army's Chief of Research and Development, my task is to develop weapons systems and equipment for a ground Army, better able to fight and win and control the land. This is the single criterion for everything we do in research and development: Does it increase our land combat effectiveness? Despite many new theories of warfare, I know of none that suggests hostile or contested territory can be either secured or held in absentia. Therefore, based on past history and predicted future areas of conflict, we can only assume that the land battle is still a paramount possibility in the Communist challenge for world domination.

We are very much concerned with the dimension of time in Army research and development. We know that we must meet this continuing and changing Communist threat with the broadest possible research and development program and the earliest possible availability of new equipment. I feel strongly that time is not on our side as of now.

LEADTIME

I am now rounding out my first year as Chief of Army Research and Development. As a result of intimate acquaintance and active supervision of our future development requirements, I have found that emphasis is needed in some three general areas. First we must reduce our weapon leadtime. The elements of boldness, urgency, and proper planning and execution must be infused in our programs to cut down this leadtime. There is a necessity for telescoping our projects so that the time from the conception of an idea until the time that the resulting hardware is in the hands of troops can be reduced to limit the present Soviet advantage in this area. As you know, their present leadtime is considerably less than ours, and this means that they can take advantage of a new scientific breakthrough and produce a weapon that utilizes this new technique in a much shorter time than we can. Or, they may be able to produce a counterweapon to one of our new developments that will neutralize or nullify its effect on any future battlefield. Now I would like to point out that we have produced some of our new weapons in a minimum length of time. One of the Army's proud examples in this category is the JUPITER ballistic missile which was successfully fired in its tactical configuration only 3 years after the project had started. This proves that leadtime can be reduced, but only under the most urgent circumstances and maximum decentralization of authority.

The other two areas where emphasis must be placed are adequate and timely funding of our programs and more streamlined management at the Government, military, and industrial levels. This is a matter of great concern to all of us, and I know that the Congress is taking a positive approach to these problems through committee actions and bills that have already been introduced.

The need for this type of action for our research and development programs is highlighted by the "quantum jump" for offensive combat that has been forced on us by the advent of the intercontinental ballistic missile and the intermediate range ballistic missile. Necessary steps must be taken through our programs to see that this challenge is met promptly. It requires all the possible energy and expeditious execution that it is possible to place behind these important developments. We must support this posture of military strength if we are to foster a more positive and dynamic foreign policy. At the same time, we need to take similar action to acquire a defense against expanding enemy missile capabilities.

Now I would like to mention briefly the scope of our Army research and development program. We conduct a substantial amount of basic research in addition to applied research and development.

BASIC RESEARCH

Most of the basic research is contracted to industry and to some 123 colleges and universities. Ten major fields and 74 subfields are covered from mathematics, human factors and medical projects, to polar and arctic research.

I might interject in the statement here, thanks to the availability of funds through the Congress for the last year, and the assistance of the University of Wisconsin in building the physical structure in which we will be housed, the new Army Mathematics Research

Center will be dedicated tomorrow morning in Madison, Wis., at the University of Wisconsin. I had planned to attend, Mr. Chairman, but it does not look as though I will be present to make the dedication ceremony.

Mr. MAHON. Maybe you can make them anyhow.

General TRUDEAU. The actual research is all done through the Army's seven technical services. We will continue to stress this type of work because, without it, there would be little future development. As a matter of fact, our technological progress today is the chief determinant of the weapon evolution during the 1960–70 period. We can never afford to neglect basic research and the Army wants to do more of it whenever we find applicable projects to further this increase of scientific knowledge.

INVESTIGATION OF SOCIAL SCIENCES

Such research is not confined to the physical sciences. Investigation of the social sciences to help us to utilize more effectively our manpower and insure man-machine compatibility with the complex engines of war being developed is vital. Should we neglect these important considerations we only aggravate the trend in which the physical sciences are outstripping the social sciences and may, in time, reach a point where the machine may destroy its maker.

APPLIED RESEARCH

Applied research and development leads directly to support for the Army's mission of defense for our Nation. To cope with any potential enemy, we must be able to move, communicate and shoot on any future battlefield—whether atomic weapons are used and whether we are on the plains of Europe, the deserts of the Middle East, the snowy wastes of the Arctic, or the jungles of Africa.

These battlefield requirements always apply directly to the soldier in combat. In fact, I would like to stress that much of this research is oriented toward that lonely man on the battlefield. We must never forget him in our concern for the more spectacular developments that constantly create newspaper headlines. The American fighting man must be utilized to the maximum possible advantage for the defense of his Nation. He must be equipped with the latest machines of war and capable of operating and maintaining them.

SUPPORT OF NASA AND ARPA

I would like to outline for you now, the areas of interest of our research and development effort for the coming year. First, the Army gives extensive support to the National Aeronautics and Space Administration and to the Advanced Research Projects Agency. Many of the satellite programs of these new agencies will give direct support to Army requirements in mapping, communications, meteorological data, surveillance, and navigation. We are proud of our repeatedly demonstrated capabilities in the field of missile and space exploration. Our extensive scientific capabilities in this field should be fully exploited for the good of the Nation.

Next I would like to discuss the very important combat aspects of mobility, communications and battlefield surveillance, firepower, and

logistical support which will make for the most effective and coordinated use of our future capabilities.

MOBILITY

In terms of improved mobility for our forces, we are gearing our programs to the concept of the pentomic battlefield where wide troop dispersion is required. We are seeking real offroad capabilities for our land vehicles since the Army has to be prepared to fight over all the varied terrains of this earth and not on the paved roads of America. We are making substantial progress with our wheeled and track vehicles in this regard but more needs to be done. In the air, we need aircraft that fly low and slow above the "nap" of the earth. Not only do we want to hug the earth with these aircraft but we must navigate over the terrain as quietly as possible.

This program in aircraft research is now beginning to have more impact. We have many types of flying vehicles in various stages of development. What we want is an aircraft that has the vertical takeoff and landing characteristics of the helicopter coupled with the characteristics of a fixed wing aircraft in forward flight. There is such a concept now under development.

COMMUNICATIONS AND COMBAT SURVEILLANCE

In the field of communications and combat surveillance which includes electronics, we find great technical advances being made. It is here that we are striving to match the requirements of the dispersed battlefield as well as the intelligence requirements to rapidly locate targets for our new missile weapons and the others that are to follow. Electronics in general has seen a tenfold increase since World War II and another tenfold increase can be expected by 1970. This is the fantastic area of development where the old vacuum tube circuits are now being microminiaturized to one-tenth, one-hundredth, and even one-thousandth of their original size and volume. This will be a tremendous savings in bulk and weight and in power requirements for an across-the-board application to all types of Army equipment.

In the field of combat surveillance we now have better photographic, radar, infrared, and television means under development to survey the battlefield and assist in location of enemy targets. Our aircraft drone program will give the Army commander a capability of surveillance for hundreds of miles forward of the most advanced combat units.

FACILITIES

I would like to mention here the importance of the various laboratories of the technical services. These facilities are spread all over our Nation and contribute substantially to civilian programs as well as to the military. As an example, our electronic warfare center at Fort Huachuca in Arizona, has already contributed an untold amount of knowledge to the electronics industry. And speaking of these laboratories, some of which are located in our arsenals, I would like to emphasize that most of the work centered there is accomplished by industry, private research institutions, and educational organizations which have contracts with the arsenal and the technical services con-

cerned. As an example, the Ordnance Corps at Redstone Arsenal in Alabama spends most its ballistic missile and space money outside the arsenal. Only 12 percent of those funds are expended on inhouse effort.

MISSILES AND ROCKETS

In the area of firepower, the development of weapon systems today is so rapid that it is hard to envision what lies ahead between now and the turn of the century. While the horse and lance remained important weapons of warfare for more than 2,000 years, the manned airplane as a weapon of war may last less than 100 years because of the advances in missilery. The heavier weapons of today are rapidly seeing transition from the kinetic energy shell of artillery cannon and weapons of all calibers, to rockets and missiles of varying types and ranges capable of projecting warheads of conventional chemical, or nuclear types with great accuracy for hundreds of yards or miles. The advance of scientific knowledge is already resulting in the obsolescence and obsoleteness of missiles considered the most advanced in the world only a short 5 years ago. The Army is attempting to keep the number of its new missile systems as small as possible in the interest of simplicity and economy. However, each missile we are developing has a definite and specific mission to support our combat plans.

Basically, the Army has two objectives in the development of missiles and rockets. First, we are, of course, a major contributor to an effective air defense for the continental United States. We are also responsible for the air defense of our field units deployed overseas and the installations which support these forces. This mission establishes our requirements for surface-to-air missile systems. As you know, we are most concerned with the threat of the ballistic missile and we look toward the development of the NIKE-ZEUS antiballistic missile system as the only effective answer to this threat in the foreseeable future. We need it today.

Secondly, the Army is striving to provide a wide variety of firepower with a spread of range sufficient to support land operations in either general or limited war. This is the basis for our requirements for surface-to-surface missiles. We are now working on a family of such missile systems to support our land troops from the battle group through the field army.

LOGISTICS

I mentioned that the subject of logistics is very vital to our battlefield concepts of the future. We are concerned with logistics as it applies to the strategic movement of Army forces in long-range troop aircraft as well as to the troop ships that move over the seas. There is much to be done in both of these areas if we are to have the strategically mobile forces that are required for the limited conflicts that at best are likely to continue to flare up along the perimeter of the Communist borders. We are seeking any way and any means to move the tremendous tonnages that are needed to fight this modern war and particularly to lighten this load. There are many interesting developments in this area that will be outlined in more detail to you later.

CONCLUSION

In closing I would like to borrow two statements from history that vividly illustrate what I believe our present situation to be and what the future could have in store for us. Cassius Clay, our Ambassador at the Court of St. Petersburg in 1861, wrote to Secretary of State Seward and made this prediction: "Russia and America will each advance in opposite directions until, both having circumnavigated half of the globe, they will meet and greet each other in the regions where civilization first began."

A number of years later, in 1915, Hudson Maxim, a great inventor and a very staunch patriot, made a statement about something that we hope will never come true in this country, and we must be prepared to prevent it. He said: "Fate has decreed that our pride shall be humbled and that we shall be bowed to the dust. We must first put on sackcloth, ashed in the embers of our burning homes. Perhaps when we build anew on the fire blocks and desolation, our mood may be receptive of the knowledge that we must shield our homes with blood and brawn and iron."

Gentlemen, I have given you some reasons for my serious concern over the situation in which we presently find ourselves. We have an aggressive research and development program that is backed by an enthusiastic Army with its mission of national defense. In Army research and development, we are intensely interested in prosecuting an adequate and dynamic program to meet our future needs. I have given you a broad outline and some personal reflections on our research and development effort and why it is so vital for our national posture and future. My Deputy, Maj. Gen. Robert J. Wood, is prepared to go into more detail. I appreciate the privilege of appearing before this committee and I stand ready with all of the personnel and resources at my command to keep you fully informed at all times.

Thank you.

(Discussion held off the record.)

PRODUCTION OF NIKE-ZEUS

Mr. MAHON. General, go promptly to the point and tell us whether or not you think we ought to go into the operational production phases of NIKE-ZEUS. Everybody else says "pour it on on R. & D. but do nothing further."

What are your views? Lay it on the line.

General TRUDEAU. I will give you my personal opinion and views in this matter. I am not a scientist. I am not a Ph. D. I have a good technical background but I do not profess to be as capable as some of the people who are developing new breakthroughs in the electronic field.

I personally feel that NIKE-ZEUS today, in its development, is as far along as perhaps some other missile systems have been when they were ordered into production.

I feel, secondly, that we need this missile very badly at the earliest possible date that it can be put on station, and it seems to me that while we are risking some funds that the overall problem of our survival against an enemy attack is the most critical thing we face.

I have heard various figures used for this. I do not know what the figures are, but even if it should come to $5 billion, we are still talking

in terms of 1 percent of our gross national product to all intents and purposes.

How much do the American people want to pay for their survival? If there is a better way, fine. Nobody else has yet suggested a better way.

Those that are dealing with the problem in the field are optimistic. Of course, you have to be optimistic if you are going to succeed in anything unless you stay on the defensive. If you are going to take the offensive, you have to be optimistic.

The people with whom I deal in this field—the industrialists, the scientists, the engineers—are optimistic of the fact that they can accomplish the things that they say they can, and our studies make many of us completely agree with them.

As a matter of fact, some of us believe that the advances in the electronic field are so great today that by the time the system is completed and deployed, we will have electronic gear—which seems to be one of the questionable items—that is more effective than what we are planning on even today; and what we are planning on today we think is effective enough to do the job.

This is one man's opinion and it differs quite a bit from others.

Mr. MAHON. In short, are you for or against going into production of the operational NIKE-ZEUS?

General TRUDEAU. I have to accede to the considered opinion of my superiors and those who have made these decisions.

If I were the controlling factor, I would go all out on NIKE-ZEUS.

Mr. ANDREWS. What would it cost at this time, or next year, to start production?

Mr. MAHON. Let us have others supply that.

Mr. ANDREWS. All right. I would like to have it at this point in the record.

(The information requested follows:)

To initiate production of NIKE-ZEUS in fiscal year 1960 would require $30 million in fiscal year 1959 funds and about $700 million in fiscal year 1960.

Mr. MAHON. Of course, General, you realize that many people are very skeptical of this system. People are skeptical of everything in the beginning stages. We have your views and we will go into that in further detail.

General TRUDEAU. Yes, sir.

VALUE OF BOMARC

Mr. MAHON. Have you given any consideration to the BOMARC missile for defense, an Air Force missile upon which we have spent many hundreds of millions of dollars?

General TRUDEAU. We are not talking about them in the same breath or for the same purpose, I am sure.

Mr. MAHON. Not at all.

General TRUDEAU. It has absolutely no antimissile capability.

Mr. MAHON. We understand that.

What is your own personal feeling as to the desirability and the capability of the BOMARC missile?

General TRUDEAU. The BOMARC has yet to accomplish anything that has not been accomplished by NIKE–HERCULES, which is on station. That is the first statement I would make in respect to it.

Mr. MAHON. Next?

General TRUDEAU. The second point I would like to make is that in my personal opinion BOMARC A is too late to meet the time threat for which it was designed.

BOMARC B is a concept, as I understand it, and I am not acquainted with it.

Mr. MAHON. In other words, you are quite skeptical about the BOMARC program in the light of all the facts and circumstances?

General TRUDEAU. I fail to see its immediate application.

Mr. MAHON. You admit that we have to have something as an air defense weapon?

General TRUDEAU. Yes, sir.

Mr. MAHON. What would you use for that?

General TRUDEAU. We do have it. We have NIKE-HERCULES.

(Discussion off the record.)

It also has intercepted objects at a speed in excess of mach 3.

I would like to mention this: For the low-level kill we feel the counterpart to NIKE-HERCULES is the HAWK which is now under production. Instead of HAWK being put on station in the United States they are being produced for oversea support of the field Army. HAWK has made kills down to treetop level.

Mr. MAHON. Your feeling is that if you had the decision to make as a Member of Congress or the executive branch you would take a good, long, hard look before you would proceed any further with the BOMARC?

General TRUDEAU. I certainly would, with BOMARC A. I am not aware of what they have in B.

Mr. MAHON. You do not propose to try to evaluate that at this point?

General TRUDEAU. No, since BOMARC B is only a concept, whereas these others are in production. HERCULES is on station.

VALUE OF NIKE-ZEUS

Mr. MAHON. Getting back for a moment to the NIKE-ZEUS, officials from other services have pointed out to us that the NIKE-ZEUS concept would give you only about ——— in which to locate the missile and knock it down, that the best place to attack the missile is in its early phase of flight, and other concepts of defense against the ICBM are far better than the NIKE-ZEUS.

Some have said the NIKE-ZEUS, even if perfected, in a way could never work. What is your response?

General TRUDEAU. We think it can work and we think it will work. There is ample time.

(Discussion off the record.)

The Air Force is putting in three BMEW's stations at a cost of something like $800 million or $1 billion to give us early warning. If they can do that then we will have warning which will be ample.

If anyone can come up and develop a weapon that will destroy the enemy missile after it is launched, that is wonderful. There are

only two things better—destroy it before it is launched or destroy it where it is being built so it cannot even be taken to a launching site.

Whoever can do that would have my complete support.

I see nothing on the horizon before the late sixties that is beyond the dream stage now that would give us the hardware to accomplish that end.

F–108 INTERCEPTOR

Mr. MAHON. I question the desirability—not that I express a view because I have no firmly held view—of the F–108 airplane, the fast interceptor aircraft which is scheduled for operation along in the 1963–65 period.

What is your feeling about that sort of plane in that period?

General TRUDEAU. The last thing I should do would be to attempt to qualify myself at all in connection with fighter aircraft.

One of the things that concerns us about the fighter aircraft as well as the BOMARC is their complete dependence upon the SAGE system, in order to function properly, to be guided to a point where they can intercept enemy aircraft. This is an important thing. As of today it is a definite limitation.

I have seen a SAGE station and it is very effective. It looks as though as long as it will operate it could work very well, but the system is incomplete and will be for some time in this country.

Mr. MAHON. You are not in a position to give any speciel views on the F–108?

General TRUDEAU. No, and I do not think the fighter aircraft is ended as long as there is a fighter bomber threat coming in.

Mr. MAHON. You need something to positively identify the craft that is approaching you.

General TRUDEAU. You have to identify and track, and you have to bring the F–108, or whatever you have there, into contact with the other chap who is moving through and cannot be seen in many cases. You have a serious problem here.

SOVIET BOMBER THREAT

Mr. MAHON. What is your feeling about the ability of the Army to compete against improved versions of the Soviet bomber?

General TRUDEAU. The Soviet bomber?

Mr. MAHON. Yes.

General TRUDEAU. I think it will be some time before they have one that can exceed mach 3 and, as I say, we have proven the capability of the NIKE-HERCULES in two successive shots, without a failure to knock down supersonic objects. One of them was moving at a speed in excess of mach 3, which is more than 2,000 miles an hour.

Mr. MAHON. Do you think this would compete against a supersonic bomber of the type which we hope the B–70 may be? Would you have a fairly good defense against that bomber?

General TRUDEAU. I do not know the speed of the B–70 but I see no reason why we cannot take care of the B–70 as well as anything else that moves through the atmosphere or any air-breathing machine. We believe we can knock down any air-breathing aircraft.

Mr. MAHON. As you know, in the past most bombers penetrated through to their target.

General TRUDEAU. Some always will get through, I suppose.

Mr. MAHON. If half of them get through, or even a fourth of them get through, that will probably be enough. I am not sure.

General TRUDEAU. I don't know. If I could save 10 or 20 million people by knocking down the rest of them it would be a well worthwhile effort.

Mr. MAHON. It would be a worthwhile effort to save several hundreds, perhaps, but is there any hope that you can eventually knock down 80 or 90 or 75 percent of attacking aircraft?

General TRUDEAU. I would rather ask General Wood that, not that I am ducking it at all. He is an expert in air defense.

Mr. MAHON. My concern is that since nobody in the past has been able to knock down more than 50 percent of the attacking bombers, and many factors should be taken into consideration, it would seem fantastic to expect us to do very well in the early stages of an anti-ICBM.

General TRUDEAU. That will be a problem.

Mr. MAHON. Off the record.

(Discussion held off the record.)

BALLISTIC MISSILE EARLY WARNING SYSTEM

Mr. ANDREWS. General, what practical good is there in having a BMEWS system to pick up a missile miles away that probably will be over the target in minutes if you do not have any means of destroying that missile?

General TRUDEAU. It would be valuable in connection with the Strategic Air Command.

Mr. ANDREWS. Could a plane destroy a missile?

General TRUDEAU. You have nothing in the world to destroy it.

Mr. ANDREWS. Without the NIKE-ZEUS system there is nothing even in the thinking on the part of any of the other services.

General TRUDEAU. There are people who may have knowledge of certain things of which I am not aware.

Mr. ANDREWS. Essentially your system would fit in with the BMEWS system in detection of that missile?

General TRUDEAU. BMEWS is most important to it.

Mr. ANDREWS. I understand that. Without some means of destroying that on-coming missile there is not much practical need to have a BMEWS system, is there?

General TRUDEAU. Except for the support of SAC.

Mr. ANDREWS. He says you cannot destroy a missile.

Mr. MAHON. It might save 25 million lives. If you give people some warning if might save them.

Mr. ANDREWS. You cannot get out of a city in a short time.

Mr. MAHON. I will yield to anybody for a question.

LIGHT TACTICAL VEHICLES

Mr. SIKES. General, there has been considerable discussion about the importance of replacing the present jeeps. There have been some suggestions. The mechanical mule has been demonstrated to us and it appears to have important advantages. We seem to be moving very slowly in this field.

Have you any ideas on what should be done and what the committee may expect?

General TRUDEAU. I do not with reference to those two particular vehicles which are under procurement now.

We are not satisfied with our progress in the automotive field, and this has to do with the fact we want better off-road mobility and we want better dependability on the part of our vehicles and our components.

Actually for the rugged type of work we have in war, we have not yet found a family of vehicles that lives up to the reliability and dependability standards that we think should be established.

These two vehicles are in that family right now.

Mr. SIKES. Does that mean new emphasis is being placed on the development of a new system of vehicles?

General TRUDEAU. That is absolutely right, sir, including new motive power such as investigation and development of gas turbines, and perhaps a vapor cycle engine.

As you know, in the tank, and perhaps in the next truck family that will have to come along, we are going into compression ignition and multifuel-type engines, but there need to be real advances in this field.

My personal feeling is that not enough has been done.

Mr. SIKES. My quarrel has been with the fact that this has been a very slow process. Do you think we can anticipate a speedup?

General TRUDEAU. I would hope so. Many of these new developments, such as new type engines, require heavier funding than we are able to put behind it. The automotive industry itself today is aware of new possibilities and new requirements on them to come up with something better than exists today. We are hopeful that through collaboration and the use of some industry funds as well as military funds, we can begin some real important advances in the 1960 time frame.

NUCLEAR POWER

Mr. BOYLE. What, if anything, is your shop doing in connection with development of nuclear-propelled aircraft?

General TRUDEAU. Nothing, sir.

Mr. BOYLE. Why?

General TRUDEAU. It is considered an Air Force project and can be properly considered so.

Mr. BOYLE. Referring to your fine statement, at page 9 it states: "Particularly as new power sources appear to be in the offing." Don't you think the whole new area of nuclear propulsion is——

General TRUDEAU. We are in nuclear power in a large way. As a matter of fact, we have a plant which we built at Belvoir. We have portable plants that are under design now which can be airlifted, and can be assembled in the Arctic. They will be much more efficient than conventional power sources and will save a tremendous amount of fuel.

We also are associated with the development of nuclear-powered engines for propelling land vehicles. The one we refer to is the land train since it has to be somewhat massive at first.

Eventually, we may get down to an automobile engine or perhaps even an aircraft engine. As of today, the aircraft engine is solely in the Air Force field. We take no exception to that.

Mr. BOYLE. You are happy with it, then?

General TRUDEAU. We are just hoping they will make fine progress.

Mr. BOYLE. It has occurred to you, of course, that the nuclear propelled aircraft has a tremendous propaganda value, has it not?

General TRUDEAU. Yes, I suppose it has, but I hope it will have a real potential, also.

MISSILE MASTER

Mr. FORD. Is there anything in the R. & D. budget for the Army for fiscal 1960 which involves MISSILE MASTER or programs related to it?

General TRUDEAU. Yes.

General DICK. About $7 million in production money is required for 1960 for MISSILE MASTER.

Mr. FORD. In the R. & D. budget?

General DICK. It is not R. & D., sir. This item right now is a production item. There is some R. & D. work to go on and I will provide that for the record.

(The information requested follows:)

The current fiscal year 1960 R.D.T. & E. Budget contains no funds for improvements to MISSILE MASTER. However, it does contain certain funds under the line item "Signal support of air defense" for study effort in the air defense fire coordination area. The PEMA budget also contains funds for SAGE/MISSILE MASTER integration tests.

Certain required improvements are planned for incorporation in the MISSILE MASTER sets authorized. It is expected that these improvements will require funds from the PEMA appropriation in fiscal year 1960.

(Additional classified information has been provided the committee.)

Mr. FORD. What I want to get into is how the MISSILE MASTER system and related components to it tie in with the so-called SAGE system. Can you give me a fill-in on that, General Trudeau?

Perhaps I can cover this with General Wood tomorrow, but I would like to have the Army's answer as to why we need MISSILE MASTER and at the same time SAGE.

General TRUDEAU. General Dick can check me on this or General Wood. They are both more qualified technically to answer that than I am.

SAGE has been designed in support of the Air Force program for air defense—in other words, BOMARC to a very large extent—and the rapid transmission of information.

In order to get compatibility between the computers and processing machines that go into the SAGE system, they have to be tied in with our MISSILE MASTER so that data can be passed down to our NIKE batteries for use there.

Would you like to add to that, General Dick?

Mr. MAHON. Off the record.

(Discussion held off the record.)

Mr. FORD. I am not satisfied with that answer but I can get the rest of it tomorrow, because I think, at least for myself, I would like to know whether there is duplication, whether it is necessary adjunct to SAGE, and I have to have more than what I have had so far. I can get it tomorrow from General Dick or General Wood.

General TRUDEAU. MISSILE MASTER is necessary in the NIKE system. MISSILE MASTER will perform its function for the NIKE system even if there is no SAGE, if SAGE is not working or if it is knocked out.

In that respect, we are different from the BOMARC system in that we are independent.

Mr. FORD. Put it the other way: Is MISSILE MASTER essential if you just have SAGE and NIKE-HERCULES and NIKE-AJAX?

General TRUDEAU. I don't know the technical answer to that, sir.

General DICK. If SAGE worked 100 percent throughout its system and design it could be of assistance to the NIKE-HERCULES.

Mr. FORD. Without MISSILE MASTER being part of the system?

General DICK. That is right. Without SAGE, the NIKE-HERCULES system can continue to fire, or any major portion of it.

Mr. FORD. Is it true that if SAGE is out and MISSILE MASTER is out, the individual battery of NIKE-HERCULES and AJAX cannot fire?

General DICK. SAGE can disappear and the system is operative only with less early warning.

Mr. FORD. I don't think you got my question. If SAGE is out, if MISSILE MASTER is out, the individual NIKE-AJAX and NIKE-HERCULES batteries can operate?

General DICK. That is correct.

Mr. FORD. In other words, what we are doing is having both SAGE and MISSILE MASTER plus an operational NIKE-HERCULES battery.

General DICK. That is correct.

General TRUDEAU. Yes, but it is correct only because the MISSILE MASTER will distribute the fires of many batteries and see that they are not all after the same target in defense made up of many separate batteries.

(Discussion off the record.)

General TRUDEAU. This is the value of MISSILE MASTER, one of the great values of it. It is not a duplication of SAGE at all.

"QUANTUM JUMP" DEFINED

Mr. FORD. One phrase is your prepared text, General Trudeau, page 6 is "quantum jump." I have seen many phrases but I have never seen that. What are you talking about?

General TRUDEAU. A quantum jump is something where we get a significant advance instead of what we call a product improvement, in other words, some slight improvement, as in a rifle, for instance. I consider the new rifle as only a product improvement over the Garand, since it operates in about the same way. There is a possibility that during the next several years we may make a quantum jump. In other words, we may make the present type of rifle obsolete by coming up with something that fires a different type of projectile.

Mr. FORD. Is this a new phrase to replace leapfrogging?

General TRUDEAU. It is about the same.

Mr. FORD. Except I understand that a little better.

COMPATIBILITY OF MANNED INTERCEPTOR AIRCRAFT AND AIR DEFENSE MISSILES

Mr. LAIRD. Mr. Chairman, General Trudeau has said the NIKE-HERCULES is capable of doing everything that BOMARC A can presently do.

What is your feeling about the compatibility of manned fighter intercept in the same area with NIKE-HERCULES or BOMARC A?

This is something which comes up before us so far as the Air Force military construction bill is concerned, but you are a witness here and you are not before the other committee. It is important from that standpoint.

General TURDEAU. I do not see that there is anything that would work adversely against the NIKE system as long as the overall control system, whether it is through SAGE or through the Continental Air Defense Command or one of its sectors, can coordinate the use of these weapons.

Mr. LAIRD. There is no disadvantage to having the location of your battery within a distance of 4 to 5 miles of the takeoff point for a manned interceptor aircraft.

General TRUDEAU. There is no danger of a NIKE missile homing on a friendly aircraft that is sent out on a mission, if that is what you are thinking of. There is a problem with respect to BOMARC.

Mr. LAIRD. There is no problem with planes taking off at the same time you are firing. That would not interfere with this system at all?

General TRUDEAU. There is always the question of clearances and identification of friend and foe. This is a serious responsibility on the part of a fighter command, which must be sure that antiaircraft is not firing while their own planes are in the same area. This is always a problem.

Mr. LAIRD. The question is whether BOMARC A can be located close to fighter intercept takeoff.

General TRUDEAU. There is a question. When BOMARC starts homing it doesn't care what it homes on. After SAGE has taken it out and it homes it on a target it will home on whatever it sees out there. It could be friend or foe.

Mr. LAIRD. Your problem with NIKE-HERCULES is a little different?

General TRUDEAU. Yes, because we can guide NIKE-HERCULES. If we are tracking an enemy target, we can bring the missile right into it.

If we know through proper identification from the Air Defense Command that this is a friendly target we will not be tracking it. We will be tracking an enemy target and bring our missile in on that.

Mr. LAIRD. In the military construction bill there is still BOMARC A authorized within an area of about 5 miles of air defense bases that will be flying intercept missions. That is hard for me to comprehend.

General TRUDEAU. It may be, although if the SAGE system is working in that particular sector they probably would be able to handle it all right. That is my personal belief.

There are problems. This takes tremendous coordination.

VALUE OF NIKE-ZEUS

Mr. MINSHALL. I realize you have a great deal of personal pride because of your service in the potential of NIKE-ZEUS, but it is hard for me to understand, as a civilian, and from all of the testimony I have heard before this commitee, how a NIKE-ZEUS could possibly prevent the destruction of this country when you consider the fact that they would probably fire a battery, say, or a salvo of 400 missiles with thousands of decoys. How could we possibly protect this country when 50 bombs can wipe us out?

General TRUDEAU. I do not know that 50 bombs can wipe us out.

Mr. MINSHALL. Dr. Teller testified before a committee of which I was a member, the Military Subcommittee of the Government Operations Committee, that 50 bombs, depending on the wind and other factors, could completely devastate this country and make it untenable.

General TRUDEAU. All right. If 50 bombs would wipe us out, and 50 are delivered, they have to figure the losses, the aborts en route. Suppose they figure two or three hundred? If you do nothing about it in the way of defense they can launch those two or three hundred when they get that many.

They may have given you a time frame.

Mr. MINSHALL. That is what I base the question on.

General TRUDEAU. At least you would delay the time in which they were capable of executing their threat, and might make it so costly they could not afford to do it.

(Discussion off the record.)

Mr. MINSHALL. I admire you for your purpose, determination, and confidence. I am not a defeatist, but in all the testimony I have heard, strangely and ironically enough the only persons who were strong advocates of the system were within the Army. It is most difficult for me as a reasonable thinking man, which I think I am, to understand this.

General TRUDEAU. I have never heard of a man failing to bar the door because he thought the intruder was going to be able to break through it, anyway.

Mr. MINSHALL. You have done about the same thing with BOMARC. You have said the BOMARC has outlived its usefulness.

General TRUDEAU. BOMARC is not even in the missile field.

Mr. MINSHALL. You have barred it from any practical use.

General TRUDEAU. It is late. It has been developed for 9 years and still is not on station.

Mr. MINSHALL. Neither is NIKE-ZEUS.

General TRUDEAU. That is true, but NIKE-HERCULES is.

Mr. MINSHALL. I appreciate that.

General TRUDEAU. And HAWK is ready to go.

Mr. MINSHALL. We are talking about two different things.

Mr. MAHON. Further questions?

Mr. THOMSON. General, you say if anyone had anything better developed than the NIKE-ZEUS that would present an entirely different problem.

We have had testimony before the committee that perhaps the reason we have put millions down the drain in some instances is that we have tried to go into weapons systems before we completed development.

General TRUDEAU. You can be taking that risk. You can be taking it on TITAN, taking it on ATLAS, you can be taking it on all these things, but is it worth the risk of some money to give America a better chance of surviving and of deterring this threat against us? This is the question.

Mr. THOMSON. What problems do you have left to lick before NIKE-ZEUS would be effective? I heard something said about not being able to do it because of the transistor problem.

General TRUDEAU. We have no problem there. We have made tremendous breakthroughs in the transistor field.

Mr. THOMSON. What is the state of development here? I have heard generally about it but I do not know what you have in the way of a weapon. Do you have a prototype of it or what?

General WOOD. I have details in my presentation tomorrow.

Mr. THOMSON. All right. I think it is high time we know what we are talking about.

General TRUDEAU. I agree.

Mr. MAHON. General, one of the things we worry about is the lack of adequate mobility of the Armed Forces, the Army and the Marines.

General TRUDEAU. Yes, sir.

DEVELOPMENT OF EQUIPMENT FOR GROUND COMBAT

Mr. MAHON. No doubt tomorrow we will have some testimony on what is being done in the area of increased mobility. You do not develop aircraft, so I do not know where you stand in that field.

General TRUDEAU. We need to develop aircraft and we are to the extent of the funds that are available.

Mr. MAHON. I know, but not the long-range aircraft that we might need to improve your long-range mobility.

General TRUDEAU. That is right, sir.

Mr. FLOOD. What the chairman means is this: When all you people get through flying around in "aerospace" I would like to talk about the Army. Nobody has talked about the Army yet. NIKE-ZEUS has nothing to do with the Army that I mean. That is nonsense in the ground war discussion. Somebody gave you that bird to see if it works. That is a Defense Department order.

General TRUDEAU. That is charged to surface-to-air defense.

Mr. FLOOD. I know all about that. You are here, according to your own language on page 4—everybody is excited about this "aerospace" glamor business—you say, "As the Army chief of R. & D. my task is to develop weapons systems and equipment for a ground Army."

General TRUDEAU. That is right.

Mr. FLOOD. So we are able to fight and win control of the land. This is the same criterion for everything we do in R. & D. It does not at once increase our land combat effectiveness.

Tomorrow you and I can talk about the Army for a change. Nobody has talked about it for 4 months around here.

General TRUDEAU. We can do it now if you want to.

Mr. FLOOD. The chairman asked you about mobility. I want to talk to you about aircraft mobility. I want to know what you are doing about the convertiplane, up to what poundage by tons, for bodies and/or Army hardware. You wound up a war with second-class tanks and with second-class guns in it, second-class armor, second-class machineguns. The Germans were better with tanks than the U.S. Army within range, armor, and gun firepower. You were second class in that. That was 15 years ago. I do not think you are any better today. I don't think your trucks are any better. I don't think your armored equipment is any better. I think you are second class to the Russian Army in mobility on the ground.

General TRUDEAU. What you say is a terrible reflection on American industry.

Mr. FLOOD. I am not interested in American industry.

General TRUDEAU. But they are the ones that built it.

Mr. FLOOD. That is not my problem. I want to find out what R. & D. is doing about it, you and American industry.

General TRUDEAU. We are doing everything we can.

Mr. FLOOD. In every war we always wound up on the short end of everything and not quite so good. You can be mighty glad that the German's didn't have gasoline, or they would have been more troublesome with their tanks.

Let's find out about your tactical ground artillery. I want to find out how far you want to go in miles. I want to find out about your tactical support and missile launchers. How far back do you want to put them, 1,000 miles, 500, or 400? I want to know how far ahead you want tactical control. I want to know how many pounds in your airplane you want to use for spotters and liaison and control of all these things, 5,000 pounds, 10,000 pounds, 15,000 pounds, or do you need that much?

This is the kind of thing I want to know about the U.S. Army. I want to know what the R. & D. will do in all those things. If General Wood can tell me all that, there is no sense keeping you here.

General TRUDEAU. We can submit a paper on that, but I would be perfectly glad to discuss it with you here.

Mr. FLOOD. But would you do it?

General TRUDEAU. I can do that.

Mr. FLOOD. There is no sense in you both doing it. If Wood can do all these things, are we agreed on this? Are we going to talk about this, or are we going to have time?

General WOOD. I think, Mr. Flood, nearly all of my presentation tomorrow is directed to Army equipment, essentially for limited war. I think you will find it interesting.

Mr. FLOOD. Then all right. There is no sense in talking to this man if you are going to do it.

Mr. Chairman, all these things that are worrying me, Wood says he is going to talk about anyhow, so there is no sense in keeping the other man here.

General WOOD. I would never say, Mr. Chairman, that I would necessarily anticipate every question in Mr. Flood's mind.

Mr. SIKES. That would be quite a research and development project.

Mr. FLOOD. Let me say I do not think you will have the answers to half of them.

General Wood. No, but I will get them.

Mr. Flood. If Wood has all this stuff, there is no sense in keeping this man here. It is all right with me.

Give us a couple of words as a fighting soldier. You have commanded troops in the field. You are not just a staff officer. What about this hardware in the pentomic setup along a 100-mile front 80 to 90 miles deep? What kind of missiles do I want? How far back do I want the launchers to be, and how far ahead do I want to shoot, 500 miles or what?

General Trudeau. There are several points to be considered here. The first one is that we do not know that a thermonuclear weapon, or an atomic weapon, I should say, is going to be permitted in the next war. Consequently, the first problem we find ourselves up against is that we have to design and equip ourselves so we can fight either a conventional war or an atomic war. Even if you have an atomic war, the cost and the numbers of atomic weapons available will not be such, for at least a long time to come, that we can discard the conventional type of weapons we know.

So we have two problems—first, to improve and seek new types of conventional weapons and, second, of course, to develop this family of atomic weapons. In between is another field, too, which is not discussed because there seems to be some antipathy against it, but which could create one of the great weapons for the next war. This is in the field of chemicals, whether lethal or nonlethal.

Mr. Flood. What we call A B C warfare.

General Trudeau. This is a tremendous field.

In the case of artillery, we do have better rounds of ammunition coming up. We have better guns of what you would call the conventional type. We are going more and more to self-propelled artillery so we do not have to have separate trucks that come and hook on. We have an excellent one now, which is just about ready to be type classified and go into production if funds are available to produce it. It will take care of the 8-inch howitzer which, as you know, has an atomic capability.

DIFFICULTIES IN DEVELOPING NEW ARMY EQUIPMENT

Mr. Flood. We have been talking about that for several years. Gen. Gavin 4 or 5 years ago took us through a whole series of pictures of a new concept of this kind of mobile hardware, armored craft, mobile artillery, and so on, under the new pentomic concept. We had screens and VuGraphs by the dozen. But what about the intelligence that we are getting back from your own Intelligence people about the quality of the Russian stuff of the same kind? My information from the Army is that at the end of the war your tanks were second to the Germans, your firepower on tanks was second to the Germans, your range was second to the Germans——

General Trudeau. We won the war.

Mr. Flood. Not with tanks—and your heavy machineguns were second and also your bazooka. That is what the Army told me. I didn't think this up. I wasn't there. I don't know.

But now what about that situation today? Where are we? Just because you have something good won't satisfy me.

General TRUDEAU. It does not satisfy us, either. We want the best.

Mr. FLOOD. How are we going to get it? What do you need—money, industry, intelligence? Why don't we have the best? Why can't we get it? What more do we have to do, General?

General TRUDEAU. I think the procurement and logistics people have appeared and showed what was necessary in order to reequip the Army. To what degree you find it possible to support that, I don't know. But these are the controlling factors. These are the controlling factors why we cannot get more into aircraft development of the types we need in the Army, and they will be the controlling factors in many more things. But this country, great as it is, is producing less than one-fifth of the tanks that the Russians produce each year. The Russians are giving more tanks to their satellites than we produce in this country.

Mr. FLOOD. Of course, as you have outlined in your statement, as against the Russians and their satellites, quantity in bodies and things we are not going to pretend to match. We cannot do that.

General TRUDEAU. That is right.

NEW RIFLE

Mr. FLOOD. That being the case, Army R. & D. has to give me the kind of Army which can handle that problem. How can you give me that kind of Army when even what you are giving me is not as good as what the other guy has in quality of material let alone quantity. This rifle is not the best, now, and you have not started to make it yet. When I say "not the best" I mean it is not much better than what you have. What about this new rifle? You have not started to make it. We are going to make millions of them. You and I know you want another one today.

General TRUDEAU. The new rifle is a good rifle. Let's not deceive ourselves. I should not be in R. & D. unless I am looking for a better one 5 years ahead, since it takes from 5 to 10 years in this country between the concept of an idea and the deployment of the finished hardware. So nothing that we have today suits me. If it did, I ought to be fired.

Mr. MAHON. Will you yield, Mr. Flood?

The gravamen of Mr. Flood's plea is that we are behind other major powers in weapons development for the Army. Will you take about 3 or 4 minutes and plead guilty or explain where we are?

General TRUDEAU. I do not think we are materially behind in our design. Speaking of the rockets and guided missiles, I think we are coming up with a good missiles system, which can use either an atomic warhead or a conventional warhead. We have a good family. We are making a lot of progress in that field.

TANK DEVELOPMENT

Mr. MAHON. I am thinking not so much of missiles, but of tanks, guns, and things of that type. Are the Soviets better than we are in that field? We know they have more quantity. Are they ahead of us in quality? If so, how can you explain that?

General TRUDEAU. I do not think they are in quality. It is true that they have a heavier gun on their tank than we have, but whether

it is more lethal against our tank than our gun is against theirs is a moot question.

Mr. FLOOD. May I interrupt you on the tank. Chrysler has now started to make that new tank. With all the great intelligence and brilliance and money of Army R. & D., which has been telling me how good you are for so many years, you put a British gun in our tanks. Why? What in the world did you put that British gun in that tank for? Can't you make one?

General TRUDEAU. It is the best gun available today. To design a new one would take another 3 years.

Mr. FLOOD. Then Army research and development, after all these years—and after all the money and all the research and all the speeches and testimony about Army ordnance and Army research and development, I nearly fell off the chair when I saw the specifications that there is a British gun in our new tank.

General TRUDEAU. That is right, there is.

Mr. FLOOD. You can't win that kind of argument. I think that is ridiculous.

Mr. MAHON. Do you think it is ridiculous?

General TRUDEAU. I think it unfortunate. I do not think it is ridiculous.

Mr. FLOOD. Withdraw the word "ridiculous," and I will embrace "unfortunate." Now, where are we?

General TRUDEAU. It is unfortunate. It does not suit me, either.

Mr. MAHON. How does it happen?

Mr. FLOOD. What happened?

General TRUDEAU. Our people simply designed a gun that was heavier than this gun, and which did not have characteristics that were superior. In other words, when they were tested out, although they were fairly close, it was definitely the opinion of the technicians and the scientists and the engineers and the rest of them who evaluated the test, that this was the better gun to put in the tank. That is the long and short of it.

Mr. FLOOD. I don't criticize them for their conclusion. I am sure it was an honest conclusion, and I think it was the right thing to do to get the best we could get from our allies and everybody else. But I am appalled when I realize that my Army research and development did not have the best.

U.S. LAG IN BASIC SCIENCE

Generau TRUDEAU. Of course, most of the basic science which has made this country great we have gotten from other countries in the past. It has not emanated here, and we have to change that.

Mr. FLOOD. I have made that statement and have been criticized for making it.

General TRUDEAU. We have to change that.

Mr. FLOOD. The Japanese are second to us in taking somebody else's ideas and making them good in basic science for 100 years, but Americans don't believe that. We are always thinking we are best, but we are not in all cases. That is what worries me.

TRANSPORT AIRCRAFT

What about your requests to the Air Force? How far did they let you go, how far could you go, would anybody talk to you, did you talk to anybody about transport aircraft for Army troops and hardware up to 6, 8, or 10 tons, which could land in a plowed field, convertaplane, short takeoff plane, any kind of plane? What happened?

General TRUDEAU. Yes; we have a 3-ton carrier now.

Mr. FLOOD. That is not enough.

General TRUDEAU. No. We can go to bigger ones when we get some money to do it.

Mr. FLOOD. When you get some money to do it?

General TRUDEAU. Yes.

Mr. FLOOD. My question was, Did you go to 6 or 8 tons? That is what I asked you about. I want an airplane, 6 or 8 tons, that takes rifle platoons, advance echelons, and light hardware into a plowed field at X miles into the line, a mobile, air army. If I don't have it, we are wasting time in limited war. Where is that airplane?

General TRUDEAU. Let's get one that will take 3 tons first.

Mr. FLOOD. All right, where is that?

General TRUDEAU. That would break the present roles and missions, and the authority has been given to us to get such a plane.

Mr. FLOOD. Who did you ask for it? Defense?

General TRUDEAU. The Department of Defense.

Mr. FLOOD. When did you ask them for it?

General TRUDEAU. It must have been given 2 years ago for the CARIBOU.

Mr. FLOOD. I am away beyond the CARIBOU. Good heavens.

All right, let's talk about CARIBOU. That is disappointing. What happened to CARIBOU?

General BRITTON. It is in its final flight stages for company certification. Our delivery of the first machine is expected in the next few months. That is the largest one that is being used as an Army development. For the others, we depend on the Air Force and their C–123 and C–130 types.

Mr. FLOOD. I am not talking about a C–130. A C–130 won't do what I want. I don't want Army troops and marines landing on airstrips, 10,000 feet long with terminal buildings and ground lights, in a limited war in any part of the world in the next 8 or 9 years. That is ridiculous. I would not want to be in that aircraft. You know what you should have.

There is no indication that you are going to get it. There is no indication anybody asked for it. Why? You don't have the kind of aircraft in your planning that you will need for the kind of war you are going to fight. How silly can you get? And nobody is talking about it.

Mr. MAHON. The question has been asked. Will you answer the question?

General TRUDEAU. How we are going to get them, I do not know. We program everything we can each year in forward progress. There is no use talking about an 8-ton plane until you can get a 3-ton plane.

Mr. FLOOD. Oh, yes, there is. You didn't fire JUPITER that way.

General TRUDEAU. There isn't money to program both.

Mr. FLOOD. There is more lacking in this show than money.

Mr. MAHON. We will resume the hearing tomorrow morning at 10 o'clock.

Thank you very much, gentlemen. We look forward to many profitable hearings with you, General Trudeau. Thank you very much.

General TRUDEAU. I shall be very happy to come back.

WEDNESDAY, APRIL 22, 1959.

Mr. MAHON. The committee will come to order. You may proceed with your statement without interruption.

STATEMENT OF DEPUTY CHIEF OF RESEARCH AND DEVELOPMENT, DEPARTMENT OF THE ARMY

General WOOD. Mr. Chairman and members of the committee, I am Maj. Gen. Robert J. Wood, Deputy Chief of Research and Development, Department of the Army.

This year our Army research and development program is presented to you in a somewhat different form than in the past. The new appropriation entitled "Research, Development, Test, and Evaluation," or simply "RDT&E" in budget jargon, has already been mentioned by General Traub. I will explain briefly its composition.

RDT&E APPROPRIATION

In previous years, research and development effort received support from several appropriations. The "Research and development" appropriation paid for the cost of development and for part of the tests. The "Military construction" appropriation provided certain development facilities. Hardware (in the form of finished components or end items) needed for tests was funded by the "Procurement" appropriation. Costs of tests conducted for the user were provided by the "Operation and maintenance" appropriation. As a result, identifying development costs of any specific item of equipment was difficult.

This new appropriation attempts to rectify this situation. It does so by incorporating all of the old R. & D. appropriation and the readily identifiable costs from the "Procurement," and the "Operation and maintenance" appropriations. Other costs, notably those associated with construction and certain aspects of procurement, were not readily identifiable. So these remain in the other appropriations for fiscal year 1960. These items are minor when compared to the overall total and are estimated to be on the order of $38 million. We hope to transfer these additional items by 1961. As an indication of the amounts involved, the budget now before you contains $1,046 million. Had this new appropriation not been established, we would have asked for $573 million for the R. & D. appropriation, $459 million within "Procurement" funds and $14 million of "Operation and maintenance" funds.

Chart 1, which has been placed before you, depicts this new appropriation by functional areas or by budget programs. This chart shows the comparison of the fiscal year 1960 dollar levels with fiscal years 1958 and 1959. In order to put all 3 years on the same basis, we have added to the 1958 and 1959 levels, "Procurement" and "Operation and maintenance" funds comparable to those which were transferred in fiscal year 1960.

Chart 2, which is also before you, is an expanded version of chart 1 showing the previous source of funds for each budget program; that is, "R. & D.," "Procurement," and "Operation and maintenance." This last chart has been prepared for background information to help explain the new appropriation.

I shall not make further reference to it at this time but you may desire to ask questions on it at the conclusion of this statement.

I shall touch lightly on each of these budget programs in turn, defining the areas and describing the nature of work conducted in each area. I shall then return to each category for detailed discussion on certain selected projects.

MILITARY SCIENCES

First, the "Military Sciences" area, which contains the Army's research program.

This area, funded at $90 million, constitutes slightly over 9 percent of the Army RDT&E budget. The apparent decrease of $7 million from the $97 million in fiscal 1959 requires a word of explanation. The 1959 level includes certain Defense emergency funds made available too late to be obligated in fiscal 1958 (and thus carried over to 1959) as well at $4 million to cover the costs of civilian pay raise enacted in fiscal year 1958. $6 million of the emergency funds provided an urgently needed "revolving fund" for certain long-term research contracts. This provision permits forward funding of these research contracts but does not afford any increase in the level of effort. Thus, the comparative level of research effort for 1959 is actually more on the order of $87 million.

Returning to fiscal year 1960, the $90 million will provide a balanced program of both basic and applied research in fields leading to new weapons, equipment, and techniques for the Army. Included are such diverse projects as research in military medicine, chemical and biological warfare agents, electronics research, studies in environment; human factors, mapping, and mobility.

AIRCRAFT

Next is the aircraft program which includes developments of piloted aircraft and related equipment required for Army air mobility. The $24 million planned for 1960 is a decrease of $6 million from the 1959 funding level. This decrease is the result of our suspending work on a new 3-ton helicopter which we had planned to test next year. Some of the work we are doing in this area includes development of a new family of turbine engines ranging from 250 to 1,000 horsepower, continued effort on the Army's latest light transport aircraft, the Caribou, and continued development of supporting equipment. As in past years, we will continue testing the various research aircraft (the flying test beds) in an effort to come up with a vehicle that is completely responsive to the Army's needs. We are still searching for a vehicle which will give us the vertical takeoff and landing of the helicopter combined with the forward flight characteristics of the fixed wing aircraft, and which will require much less maintenance than anything we now have.

MISSILES

The third area, "Missiles," requires the lion's share of the R. & D. dollar—52 percent. The increased level of fiscal year 1960 funds—$543 million compared to the $455 million for fiscal year 1959—reflects the high costs of two missile systems: NIKE—ZEUS and PERSH-

ING. Together these two weapons account for $369 million or 70 percent of the total for missiles. Development costs of these same two systems in 1959 is $278 million.

The remaining $174 million in this area continues the development of the other surface-to-surface and air defense missiles in the Army's family.

SHIPS AND SMALL CRAFT

The program for "Ships and small craft," which is next in order, is funded in fiscal year 1960 for $170,000. This will permit the small amount of independent work we require on development of small boats needed in ship-to-shore and over-the-beach logistical operations. Since we rely on the Navy and the Marine Corps for most of the development in this area, the program is small. In fact, it has been decreasing annually.

ORDNANCE, COMBAT VEHICLES, AND RELATED EQUIPMENT

Up to this point, the functional areas I have described have been essentially the same as in the previous years' budgets. Only the magnitude of funds has been changed to reflect the additional moneys from other appropriations. The next area, titled "Ordnance, Combat Vehicles, and Related Equipment," departs from the pattern of previous years by combining all vehicles, artillery, small arms, and ammunition. Formerly, these were divided into three separate areas. To provide a better representation of the use of funds, we have divided the area into two subareas as shown on chart 1, "Surface Mobility", and "Firepower Other Than Missiles." The $124 million total in this budget program is an increase of $34 million over 1959. This represents our increasing concern with developing improved conventional weapons and equipments which are required by the Army in any scale conflict.

In the area of "Surface Mobility" the fiscal year 1960 budget contains $44 million as compared to $28 million in fiscal year 1959. This significant increase is required in our air-transportable armored personnel carriers, in our new light truck family, in the GOERS logistical vehicle and in development of a radically improved armament for tanks.

I will have more to say about the GOER and the tank armament later.

The $80 million in firepower other than missiles is an increase of $18 million over fiscal year 1959. This increase will be absorbed by the DAVY CROCKETT system, by the LITTLE JOHN free rocket together with its atomic warhead, by new artillery weapons, and by improvements in conventional ammunition. Other projects in this area include the host of other weapons, ammunition, and mines required by our fighting forces.

OTHER EQUIPMENT

The budget program "Other Equipment" which appears next on the chart includes all of our work on communications equipment, our combat surveillance projects, and the many items used in combat support of the field army. The $144 million for fiscal year 1960 is about the same as for fiscal year 1959.

PROGRAMWIDE MANAGEMENT AND SUPPORT

The last budget category of concern to the Army is that of "Programwide Management and Support." This includes funds for operation and management of research and development facilities, laboratories, proving grounds, and missile ranges. Fiscal year 1960 funds planned for this program are slightly less than in 1959.

One further item on the charts which requires comment is the $61 million listed for DOD agencies. This represents funds carried in the Army budget for the National Security Agency and for the Armed Forces special weapons project. These funds are not under Army control, and I understand the committee will be briefed by representatives of the two agencies concerned.

ARMY RESEARCH PROGRAM

I shall now describe in some detail a few of the more significant projects which will be pursued with the funds in this budget. Considering first the military sciences program, let me emphasize that Army research is designed to exploit the growing worldwide scientific potential, with concentration of effort in areas of potential Army interest. While much of Army research is ultimately of value to the civilian community, such value constitutes a bonus effect, since our research work is primarily for military needs. The fiscal year 1960 budget will continue to support both basic and applied research and will maintain a balance between programs conducted at Army installations and those conducted by contract. As examples of some of the key parts of Army research which will be pursued next year I cite the following:

(1) A continuing and broadening program to improve the materials that will be used to make all types of Army equipment and weapons.

(2) Expanded medical research into the several aspects of atomic warfare medicine.

(3) Research toward improved energy sources and energy conversion systems to ease the logistic problem of supporting a field army.

(4) Expanded research in communications sciences.

(5) Human factors research to meet the qualitative manpower requirements of modern land warfare.

In addition, outside the Army budget we are doing some work for the Advanced Research Projects Agency in physics of the upper atmosphere, particularly in relation to the employment of atomic weapons in air defense missiles.

In order to keep this presentation within reasonable time limits, I shall offer only two specific examples of our work in research, although many fascinating projects are being pursued.

POLYURETHANE FOAM

The first is in the field of medicine. Our scientists at Walter Reed Army Institute of Research and at the Hahnemann Medical College and Hospital in Philadelphia have been experimenting with a substance known as polyurethane foam for repair of broken bones. The material is a fast-setting plastic which is used to cement ends of broken bones together or it can be inserted between the severed ends of a bone

to replace missing segments. Before hardening, the foam is molded to fit the natural contour of the bone. Here is a sample of the material and of a broken donkey bone mended with the foam. [Passes out samples.] This has tensile strength equivalent to the bone structure itself. For example, in the case of a broken leg the material is hard enough within 2 days to bear the weight of the individual. This can mean a great decrease in the number of cases which spend months in traction or in casts, with a consequent savings in Army manpower. Further, by greatly reducing the convalescent period for fractures and grafts, an ultimate saving on hospital space should ensue. The donkey bone I have here does not have the same strength I have described. This bone was dead when mended, and consequently lacks the rigidity and strength achieved in the repair of live bones.

Mr. MAHON. I think that it would be excusable at this point to violate our procedure and interrupt for an interrogation before you finish your statement, particularly on this specific program.

When Admiral Bennett and Admiral Hayward of the Navy were before us they spoke of a white substance that had been perfected for the use in bone repair. Is this the same thing?

General WOOD. I do not know, but it is probably the same thing, since the medical people are close together in exchanging ideas.

Mr. MAHON. Do we have unnecessary duplication of effort in connection with this research and development of this particular project?

General WOOD. I would not think so, though I do not know for certain.

Mr. MAHON. I would like to ask you or General Moore to see that this is coordinated and reference is made to the other testimony in order that we may see how this work is carried on and whether or not it is the same project that we discussed before.

General MOORE. We will put a statement in the record.

(The information requested follows:)

We understand that the "white substance" referred to was inorganic bone, which is ordinary bone from which organic material has been removed leaving only the inorganic supporting structure. As stated by Admiral Bennett, inorganic bone is of great value for filling defects in the skull and certain other nonweight-bearing bones, but because of its lack of strength is not as useful in long bones. The Army Medical Service work carried on at Walter Reed Army Institute of Research is directed toward providing a practical method for quicker repair of major fractures of long bones. The "bone glue" is expected to provide not only temporary fixation of the fracture, but also stimulation of bone growth with ultimate absorption of the plastic while the patient is back at work or on duty. This method of treatment should reduce the lost time accompanying current methods of treatment.

Mr. MAHON. Mr. Crosby has a statement that he can read into the record.

Mr. CROSBY. This is the statement of Admiral Bennett. He said:

In the area of medicine, completely cleansed bony material, sometimes called inorganic bone, appears very successful in animal experiments in known grafting, so much so that the material has been incorporated into the animal's system.

General WOOD. He did not name it? He did not use the expression "polyurethane?"

Mr. MAHON. Is this the same thing?

General WOOD. Probably; we will find out.

Mr. FLOOD. You had better check this with the Air Force. As soon as they find this out they will start a program.

Mr. MINSHALL. Is this material being used by private doctors?

General WOOD. I cannot answer that, but I will get the answer for you.

(The information requested follows:)

Admiral Bennett presented information concerning research at the Naval Medical Research Institute, Naval Medical Center, Bethesda, on the use of inorganic bone in bone grafting. The Army program being conducted at Walter Reed Army Institute of Research is concerned with the use of a plastic material, polyurethane foam, for repair of fractures, particularly of the long bones. The Department of the Air Force has no ongoing work in this area.

In answer to the question concerning use by private doctors, we would say that important research still needs to be done before the method is generally used. The research referred to concerns the long range toxic effects of the polyurethane. These aspects are being studied at Walter Reed Army Institute of Research.

Results of Army medical research are available to the civilian medical community. In this case, research efforts at Walter Reed Army Institute of Research were coordinated not only with other Government agencies but were conducted in close cooperation with a similar effort being carried out at the Hahnemann Hospital, Philadelphia, Pa. The work was first reported on October 2, 1958, at the Chicago session of the American Association for Surgery of Trauma by Dr. Michael P. Mandarino. Initial results of the WRAIR and the Hahnemann Hospital work were reported in Annals of Surgery, volume 149, No. 1, January 1959, pages 107–109, under the title, "Polyurethane Polymer, Its Use in Osseous Lesions: An Experimental Study." As progress warrants, further reports of the work at WRAIR will be submitted to recognized surgical journals of publication.

Mr. MAHON. It is wonderful and heartening the progress that is being made.

General WOOD. You will notice that I said that this was developed by the Army and the Hahnemann Medical College in Philadelphia, so I would say that it is a combined Army-civilian project.

Mr. MINSHALL. And this is reported in the American Medical Journal, I presume?

General WOOD. I suppose so.

Mr. MAHON. You may proceed.

INCAPACITATING AGENTS

General WOOD. A second example in the research area concerns our recent success in the incapacitating or nonlethal chemical warfare agents which may well become key weapons in limited warfare situations. One of the agents which offers promise is known as LSD. This particular agent is effective either as a gas or as a liquid. While the most practical means of administering the drug will be by inhalation of the gas, it is equally effective when swallowed or injected into the body in its liquid form. The net result in either case is to upset the behavior pattern of an individual to the point where he is not effective. The results are temporary and leave no harmful after effects.

Mr. SIKES. Is the use of the gas as effective as the use of the material by injection?

General WOOD. Yes, just as effective.

Mr. MINSHALL. Does it have any odor?

General WOOD. I cannot answer that. I will have to get the answer for you.

(The information requested follows:)

LSD–25 has no odor.

General Wood. I understand that General Stubbs, the Army chief chemical officer, is scheduled to brief you soon and will provide additional information on this important development.

So much for our research program. The remainder of my discussion concerns our development of items of hardware. Here is a promising development in the important field of air mobility.

DUCTED FAN RESEARCH VEHICLE

This is one of our test vehicles used to try out principles and will probably bear little resemblance to the final product. This particular model is made by the Piasecki Co. Chrysler and Aerophysics are working on other versions employing the same principle. This vehicle uses counter-rotating propellers built into the deck both in front and behind the operator. Initially we called this the flying jeep until the Willys Motor Co. reminded us that the name "jeep" was protected by copyright. So now we simply identify it as the "ducted fan research vehicle." This sequence shows the first flight tests and as you see, the operation is cumbersome. Admittedly we have a long way to go before the stability and control reach the level we require, but these tests established the feasibility of a vehicle of this type.

We expect to use the ducted fan vehicle primarily as a command and reconnaissance vehicle and as a weapons carrier. Contrary to what you may be thinking, it will not be an easy target for enemy fire. This is not a high flying, high performance aircraft. It will skim the earth's surface, taking advantage of protection and concealment offered by hills, valleys, trees, and the like and will be exposed for only a few seconds at a time. It will also have a limited ground movement capability.

Mr. Flood. Suppose that you had a perfect vehicle. What would be its broadest and narrowest tactical value?

General Wood. I would say from this principle, Mr. Flood, we will be able to develop a vehicle for reconnaissance, for observation, for artillery fire control, and perhaps even for mounting some types of weapons for suppressive fire.

Mr. Flood. It would not carry more than a squad of people?

General Wood. No, sir; I think not—not this particular configuration anyway.

Mr. Thomson. Four years ago at a demonstration at Benning they showed a flying jeep. Is this the same thing?

General Wood. We called this the aerial jeep. The Willys Motor Co. said that the name "jeep" was copyrighted. We now call it the ducted fan research vehicle.

Mr. Flood. You have no tactical intention of moving large bodies of troops up to regimental strength up a mountain or over a mountain?

General Wood. Not regimental strength.

Mr. Flood. Would you move a company in a hurry over strong points?

General Wood. No.

Mr. Flood. Will you use 20 and take 20 squads?

General WOOD. I think that we would certainly consider such employment.

Mr. ANDREWS. What would be the advantage of this machine over a helicopter?

General WOOD. There may be several advantages. Certainly one might be ease of maintenance. As you know, the helicopter is not an easy machine to maintain. It is a costly machine to maintain. It has so many parts to it. This is simpler so far as maintenance is concerned. The use of this cushion of air principle, of which this is a partial application, is one in which we are doing research. We think it may well replace the helicopter in part.

Mr. ANDREWS. How high would you hope to go with one of those machines?

General WOOD. I would hate to guess for the moment.

Mr. MAHON. It has growth potential, I assume?

General WOOD. Now I will ask General Britton to discuss this.

General BRITTON. We consider this vehicle would not operate over 50 or 100 feet. We do not look on this as a particularly high-flying vehicle because of its configuration.

Mr. ANDREWS. If troops were located anywhere around, it looks like it would be a sitting duck.

General BRITTON. That is the reason that we want to stay low, in the hills for protection and still be free of the ground.

Mr. FLOOD. Would there we any armor plate on the bottom or the sides?

General BRITTON. No, because of the ducted fans. You might be able to put a plate under the pilot's seat. That is what is done in fighter planes today.

Mr. FLOOD. Just that.

General BRITTON. You can do a little bit, but not much. You add too much weight.

Mr. MAHON. You are working along on something that might be highly worth while. You cannot tell yet.

Mr. MINSHALL. What would be the maximum horizontal speed?

General BRITTON. Twenty-five to 40 miles an hour. We are not trying to design speed into it. You could design it for higher speed.

Mr. MINSHALL. How is it with regard to maneuverability?

General BRITTON. The initial flights appear quite good, sir, in side movements and speed and hovering so that you can actually operate it with the freedom that you would operate a highly mobile cross-country vehicle in fairly good terrain, among trees and things like that.

Mr. MINSHALL. Compared to helicopters how much skill is required in its operation?

General BRITTON. We are using helicopter pilots right now, and this first vehicle takes about the same skill as a helicopter. The Chrysler version is designed for much simpler control. There is some hope that we can achieve a lower training requirement, although initially we must start with the helicopter.

Mr. THOMSON. Something with a lower silhouette than a helicopter is a must.

General BRITTON. We also want to get rid of the rotor. Around trees it is dangerous. It is difficult for the pilot to know where the

rotor is. This configuration gives him a narrow vehicle. It is not quite as efficient in lift as the helicopter.

Mr. FLOOD. Have you talked to the Marines about this?

General BRITTON. They are following our work very closely.

MISSILES

Mr. MAHON. You may proceed.

General WOOD. I would like to turn now to a few examples of new development in the missiles area or status reports on items mentioned last year.

(Discussion off the record.)

Mr. SIKES. This is for use in the field by troops?

General WOOD. Yes.

Mr. FLOOD. This is what I wanted to talk to General Trudeau about, because the next few minutes is the whole basis of the next several years of Army limited warfare—tactical missiles and troops.

Mr. MAHON. Let us proceed until he finishes his statement.

SERGEANT MISSILE

General WOOD. For support at the corps level, we have the solid propellant guided missile SERGEANT which will replace the older liquid fuelled CORPORAL. Test firings we have had to date have been very encouraging and indicate that we will achieve the accuracy we want. The use of the solid propellant motor and the all-inertial guidance system mark quite a step forward in missile support, particularly in field handling characteristics and in susceptibility to electronic countermeasures.

Mr. FLOOD. What is the yield?

General DICK. Off the record.

(Discussion off the record.)

Mr. FLOOD. What is the area kill yield on HE on this bird?

General WOOD. I will supply the area that the burst would cover.

Mr. FLOOD. Put it in the record because that is going to be the war if there is to be one.

(The information requested is classified and has been furnished separately.)

PERSHING MISSILE

General WOOD. The PERSHING missile is being developed to replace the reliable REDSTONE for the support of the field Army. We are making significant strides in developing a small, light-weight, all-inertial guidance system on PERSHING. The entire system will be air transportable as well as highly mobile on the ground. In addition, all of the components required to fire the missile can be transported by organic Army aircraft.

SURFACE-TO-AIR MISSILE

So much for surface-to-surface missiles. I'd like to turn now to some of the Army's surface-to-air missiles.

(Discussion off the record.)

NIKE ZEUS

For defense of the United States against ballistic missiles we are devoting maximum development effort on the NIKE ZEUS.

You will recall I discussed the ZEUS at length last year and you have heard many references to it so far during this session. The present status of development work is extremely encouraging. The success of the program to date will permit us to have an early system demonstration.

As I indicated earlier, our work in providing adequate surface mobility for the Army ranges from small tactical wheeled and tracked vehicles through enormous land trains for moving bulk supplies and equipment. I have three examples of this program to show you today. The first concerns our work on self-propelled carriages for the Army's heavier artillery pieces.

SELF PROPELLED CARRIAGE

Here is a light-weight, self-propelled carriage for the 8-inch howitzer. This carriage is multipurpose and may mount either the 155 mm. or the 175 mm. gun in place of the 8-inch howitzer. This carriage wil be ideally suited for the highly mobile forces required on the modern battlefield, since it can occupy a position, fire, and then displace to a new position in a matter of minutes. The cruising range will be 190 miles, a significant advance over previous vehicles of this type. Here is the 175 mm. gun on the same carriage.

Mr. MINSHALL. Is this a weapon to be in your permanent inventory or is this a stopgap?

General WOOD. That opens up quite a field of discussion. I would say we feel we will always need our artillery, particularly since we don't know what kind of fracas we will get into, particularly since artillery has uses which so far as flexibility of fire is concerned and numbers of rounds are concerned and cost of those rounds, the missiles have not yet equaled.

Mr. MINSHALL. What will a howitzer do that an HONEST JOHN or LITTLE JOHN can't do?

General WOOD. It is not necessarily duplicative.

Mr. MINSHALL. Not necessarily but it is in fact, is it not, General?

General WOOD. No more duplicative than a pistol of a rifle or a club of a stone.

Mr. MINSHALL. I don't mean that all.

General WOOD. It is part of the Army weapons system. We think, for the moment, that we have to have both missile family and artillery family.

Mr. MINSHALL. Your analogy is not a good one; a rifle and pistol have different ranges. I am talking about things that have the same range.

General WOOD. This 175-millimeter gun will have on the order of 30,000 or 35,000 yards range. It will be particularly worth while for counterbattery fire or counter-missile-launching-site fire.

Mr. MINSHALL. Would not your missile be able to do the same thing?

General WOOD. I would say there would be situations where, due to the availability of artillery, and because it is cheaper than missiles, it would be better to use artillery than missiles.

Mr. MINSHALL. I hate to see the Army get into the same degree of duplication as have the Air Force and Navy.

Mr. SIKES. What is the relative size of the warheads?

Mr. FLOOD. The 8-inch howitzer has an A-head.

Mr. SIKES. This has a smaller yield. I think that is the point.

General WOOD. Off the record.

(Discussion held off the record.)

Mr. SIKES. You use this in situations where you do not want to use atomic warheads. Is that true?

General WOOD. That is right.

Mr. THOMSON. From the standpoint of weight, how does the shell here compare with the missile?

General WOOD. It is much lighter, sir.

Mr. THOMSON. From the standpoint of logistics and target selection they accomplish a different mission.

General WOOD. Yes, sir.

Mr. SIKES. It would be well to provide a complete comparison of weapons under discussion, showing weight characteristics, the number in each unit, relative costs, the reasons why there should be each of these weapons rather than just one weapon. Otherwise this will be a rather confusing record.

Mr. MAHON. I think the position is well taken.

General WOOD. We will be glad to supply that information.

Mr. FLOOD. Show the need for this mix.

(The information requested is classified and has been provided to the Committee separately.)

GOER

General WOOD. The second item in this field is a very promising development known as the GOER. Here is a model of a cargo version of this vehicle.

This is an outgrowth of recent developments in heavy construction equipment and will provide a solution to the problem of moving rapidly a large volume of supplies and POL for the fast-moving combat units of the future. The construction is simple; only four wheels are employed instead of six or eight, and the large-diameter, low-pressure tires and wagon-type steering provide excellent offroad mobility. We are building 15-ton cargo and 5,000-gallon tanker prototypes using commercially available parts. Testing of these prototypes will begin in fiscal year 1960.

COMBAT VEHICLE WEAPONS SYSTEM

One further development in mobility concerns our efforts to reduce the weight of our tanks. The M–60 tank, which will become available beginning in fiscal year 1960, is still much too heavy for our needs. It will weigh 51 tons initially; eventually we may reduce it below this weight. To get the weight of our future main battle tank down to around 30 tons and still retain adequate survivability we determined that a radically new approach to the tank armament was required.

At present we call this project the combat vehicle weapons system.

IMPROVED HONEST JOHN

The next film sequence is of the improved HONEST JOHN rocket. You may recall that HONEST JOHN development was initiated shortly after the outbreak of the Korean war. The rocket has been operational since 1954 and is now in worldwide use, manned by both U.S. and Allied soldiers.

In this sequence you will see first an old HONEST JOHN. Following this is a new one, shown on its improved truck mount. Then you will see the new one fired.

The improved system marks quite an advance for this old reliable rocket.

COMBAT SUPPORT ITEMS

These developments in firepower and mobility I have described thus far, must be matched by corresponding developments in combat-support-type items if we are to have an effective fighting force. The projects in this field are numerous and varied. To mention only a few of the items involved, we have work on improved clothing, on footgear and on body armor. We are developing improved mine detectors and eradicators. We have an automatic detection device to give warning against chemical attacks. To provide individual protection against such attacks, a new lightweight gas mask has been developed.

These projects do not lend themselves to the spectacular developments witnessed in the field of missiles and electronics. Yet they are at least of equal importance. Our goal in this field is to reduce the weight and improve the efficiency of equipment required for the combat units.

BALLASTABLE ALL-PURPOSE TRACTOR

One example of a hardware development in this field is demonstrated by the ballastable all-purpose tractor.

Construction equipment, so essential to any Army, and of increased importance on the modern battlefield, has always been the millstone around the neck of military planners. To be effective, such equipment must be heavy; to be mobile and air-transportable, it must be light. By designing the tractor with self-ballasting features, we meet the requirements for mobility and air-transportability. This unit weighs only 16,000 pounds and can be air landed or air dropped. Once on the ground, any available material—earth, rock or even water—can be added to produce an operational weight of 32,000 pounds.

RADIO COMMUNICATIONS

In the field of communications, radical changes are taking place.

Here is a radio system which will permit forward area commanders to be in touch with their command posts or higher headquarters at all times. This system provides telephone-type service by radio to vehicles on the move. Up to 18 private circuits are provided from a single radio central; and this central is in turn connected to every other radio or telephone switchboard in the area.

This set, as is the case with all of our new radios and other communications equipment, emphasizes reduced weight, reduced size, increased range, and ease of maintenance. The use of transistors is

being exploited fully in our developments. The next generation of communications equipment will employ an approach known as microminiaturization. This replaces the current transistors with flakes of material a fraction of an inch thick and less than 1 inch square. These flakes in turn can be stacked one on top of the other to form complete assemblies. As much as a tenfold reduction in size and weight over the most advanced systems presently known is in prospect. [Holds up fountain pen radio.] Here, for example, is a complete radio receiver and battery which fits inside a fountain pen. This is a handmade operating model and is admittedly crude. The advantages of applying the development to tactical equipment is obvious.

COMBAT SURVEILLANCE

Closely allied to our communications developments is work in combat surveillance. The Army's ability to deliver firepower must be matched by an equivalent ability to locate targets. Our goal is to insure a continuous, all-weather, day-and-night watch over the battle area. We have ground radars and infrared devices which, together with airborne radar surveillance devices, provided a limited capability. They do not, however, satisfy our needs. The most promising approach we have today is through the use of drones mounting cameras, radars, and infrared devices. Here is a brief film demonstrating this approach.

There you see the takeoff of a drone now being developed for Army use. Note its stability in flight. This stability provides an excellent platform for either cameras, infrared devices, television or radar sensors. The parachute permits safe, reliable recovery within our own position at any point selected by the drone control operator. Preparation for another launch is simple and quick. Within minutes this drone is ready for another mission.

This radar picture of Tucson, Ariz., was made by the Michigan high resolution radar—a dramatic technological breakthrough. For the first time we are able to obtain pictures of adequate clarity under almost any weather conditions. General Magruder mentioned this item when he was before this committee last month.

This particular drone is by no means the final answer to our problem of providing 24-hour surveillance over the battle area. We are working on more advanced systems which will give us higher performance, greater payload and longer endurance. The entire field of combat surveillance is challenging, and has a high priority in the Army's research and development program.

SPACE ACTIVITIES

The last area I will mention involves the Army's activities in support of the national space effort. In this support we perform work for both the Advanced Research Projects Agency and the National Aeronautics and Space Administration.

In support of ARPA we have first the development of a 1.5 million pound clustered liquid rocket engine booster for space vehicles. Second, the development of communications satellites to include both repeater type satellites and stationary satellites for instantaneous

transmission to any spot on earth. Third, development of a meteorological satellite. Fourth, development of the doppler portion of the satellite acquisition and tracking network. Fifth, conduct of various research projects in such fields as propellants, radar tracking, ballistic missile defense and electronics phenomena. These items are not included in the Army budget as work is done for ARPA on a reimbursable basis. During 1958 and 1959 some $80 million was provided by the Department of Defense for these items.

Army activities in support of the National Aeronautics and Space Administration include continuation of the scientific satellite and space probe program initiated by the Advanced Research Projects Agency. Under this program the Army is now scheduled to fire a scientific satellite and an inflatable balloon satellite. We are also supplying eight JUNO II launching vehicles to NASA, and will fire these vehicles in order to place scientific payloads designed by NASA into space or orbit. Finally, project MERCURY, NASA's manned space capsule program, will include Army participation. The Army will test the NASA capsule through ballistic trajectories using eight REDSTONE boosters and two JUPITER boosters. To date NASA has provided $24 million for these programs and an additional $13 million is expected before the end of fiscal year 1959.

Beyond these contributions to the national space program, we have an active interest in those particular aspects of space which will assist Army missions materially. Satellite vehicles are of vital importance to land warfare of the future. They will be used for mapping and geodesy, communications, ballistic missile warning, space defense and meteorology. They will be particularly valuable for reconnaissance, with emphasis on battlefield surveillance. Other application of satellite and space vehicles will become feasible as the state of the art progresses. At present satellite programs have as a basic objective the acquisition and transmission of data.

In the future, these applications will be refined. At that time satellites could become active machines of war.

I want to emphasize that in accomplishing the urgent goals I have described, the national space program transcends the individual military services, and will require maximum participation by all qualified agencies. The Army is uniquely qualified to support this vital program. As the agency which produced the first successfully tested intermediate range ballistic missile in the free world and possibly in the entire world, and which put the free world's first earth satellite into orbit, the Army has been a pioneer in space. As has been the case throughout the history of this Nation, the U.S. Army stands ready to devote unstintingly its resources, its energies and its talents to the security and welfare of this country. We are preparing alike for the teeming jungle, the frozen waste, and for any and all calls made upon us to assist in the unchartered reaches of outer space.

In summation, gentlemen, Army research and development is engaged, within its means, in modernizing the Army weapons and equipment required on the future battlefield, be it a battlefield in a limited war fought far from our shores or a battlefield consisting, God forbid, of our very homes themselves.

(The following tabulations were submitted:)

CHART 1.—*Army R. D. T. and E. budgets, fiscal years 1958, 1959, and 1960*

[Million of dollars]

	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960
Military sciences	93	97	90
Aircraft and related equipment	60	30	24
Missiles and related equipment	321	455	543
Ships, small craft and related equipment	0.4	0.3	0.2
Ordnance, combat vehicles and related equipment	96	90	124
Surface mobility	(34)	(28)	(44)
Firepower other than missiles	(62)	(62)	(80)
Other equipment	122	142	144
Programwide management and support	56	64	60
Subtotal	748	878	985
DOD agencies	53	70	61
Grand total	801	948	1,046

CHART 2.—*Army R.D.T. & E. budgets, fiscal years 1958, 1959, and 1960*

[Millions of dollars]

	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960
Military sciences	92.8	97.2	89.8
R. & D.	(92.4)	(96.5)	(88.0)
PEMA	(0.4)	(0.7)	(1.8)
Aircraft and related equipment	60.0	30.3	24.1
R. & D.	(12.1)	(16.2)	(17.3)
PEMA	(47.6)	(13.8)	(6.6)
O. & M.	(0.3)	(0.3)	(0.2)
Missiles and related equipment	321.1	454.7	543.3
R. & D.	(183.2)	(200.1)	(213.7)
PEMA	(137.9)	(254.6)	(329.6)
Ships, small craft, and related equipment	0.4	0.3	0.2
R. & D.	(0.3)	(0.2)	(0.2)
PEMA	(0.1)	(0.1)	
Ordnance, combat vehicles, and related equipment	96.2	89.7	124.4
R. & D.	(60.7)	(56.6)	(71.2)
PEMA	(35.5)	(33.1)	(53.2)
Other equipment	121.5	142.4	144.3
R. & D.	(51.6)	(74.2)	(74.4)
PEMA	(68.3)	(66.2)	(68.1)
O. & M.	(1.6)	(2.0)	(1.8)
Programwide management and support	55.7	63.7	59.8
R. & D.	(49.7)	(56.7)	(53.2)
O. & M.	(6.0)	(7.0)	(6.6)
Subtotal Army	747.7	878.3	985.9
R. & D.	(450.0)	(500.5)	(518.0)
PEMA	(289.8)	(368.5)	(459.3)
O. & M.	(7.9)	(9.3)	(8.6)
DOD agencies	53.6	70.0	60.6
R. & D.	(42.4)	(53.9)	(55.0)
O. & M.	(11.2)	(16.1)	(5.6)
Grand total	801.3	948.3	1,046.5
R. & D.	(492.4)	(554.4)	(573.0)
PEMA	(289.8)	(368.5)	(459.3)
O. & M.	(19.1)	(25.4)	(14.2)

General WOOD. Mr. Chairman, that completes my prepared statement. As I mentioned earlier, I thought from your interest in the subject it might be worthwhile to discuss further the ZEUS program. You recall I had some film last year showing hardware development of ZEUS. I did not put it in my presentation today because I did not want to duplicate what I did last year. However, it occurred to me that your new members might like to see this and I have added to it some recent footage which might explain the system

or refresh the minds of the committee on the system, if you want to spend 10 minutes looking at it.

(Off the record.)

R. D. T. & E. APPROPRIATION STRUCTURE

Mr. MAHON. General, We have a new configuration of the research, development, test, and evaluation program this year insofar as the proposed language in the defense appropriation bill is concerned. Are you finding this new approach satisfactory?

General WOOD. As I said, Mr. Chairman, it should certainly provide a better picture of what R. & D. costs might be, because it puts them all in one place.

I would say, since it is brand new and we are not starting it until July 1, comment on its actual operation might well wait until later, but I foresee no particular difficulties with it.

Mr. MAHON. You are not disturbed about it?

General WOOD. No, sir.

Mr. MAHON. You think it can be made to work insofar as you can now foresee.

General WOOD. Yes, sir.

Mr. MAHON. If you had been the one to make the final decision, do you think you probably would have undertaken this kind of procedure?

General WOOD. The Army did not think it up, as I think General Traub told you, and the Army staff was divided on it. We took the position that we could live with it, and I think we can.

Mr. MAHON. Do you think it will have the effect of retarding the program?

General WOOD. No, sir, I do not.

LANGUAGE CHANGES

Mr. MAHON. The proviso shown in the language on page 10 is about the same as requested for the Air Force and the Navy, is it not? I understand it will be required for 1 year.

General WOOD. On page 10 of my script, sir?

Mr. MAHON. Of the justification book.

General WOOD. I have with me Mr. Woodside, who is the man who always answered Mr. Wigglesworth's detailed questions on this book, some of them over my head. I have asked him to be an expert on these texts. I will ask him to advise me now, if I may, sir.

(Off the record.)

Mr. MAHON. This is a 1-year proposition, is it not, on page 10?

Mr. WOODSIDE. This, sir, is the change in the appropriation language over what it has been in past years. We assume that the same language will be in for future years. There will not be a change page in future year budget, no.

Mr. MAHON. The particular proviso is in the portion to which I made reference.

Provided, That during the current fiscal year there may be merged with this appropriation such amounts of the unexpended balances of appropriations heretofore made available for research, development, test, and evaluation as the Secretary of Defense may determine to be necessary for the accomplishment of the program for which this appropriation is made.

You will not need that indefinitely, will you?

General WOOD. We would not need it indefinitely. We may need it for maybe 1 or 2 years.

Mr. MAHON. General Moore, will we need it another year?

General MOORE. They will make all the transfers they need under this, and next year they will not need it.

DECREASE IN AIRCRAFT PROGRAM

Mr. MAHON. The program for aircraft and related equipment is decidedly less than last year. Why is this? Have the Army needs in this area to some extent been met? Does this indicate a deemphasis, or what is the meaning?

General WOOD. Let me say that the program as presented here is, of course, based on the Defense Department's reaction to the Army's proposed program, in which there was a greater amount than this. In this particular area, I believe that during the coming fiscal year it will be necessary for us to rejuggle some of our programs and put a bit more money into aviation than this shows. This leaves it, as you say, much less than it should be.

Mr. MAHON. You are giving us a false picture or you are giving us a misleading picture. You are not now, but——

General WOOD. I am in the position of addressing myself to the picture given you by the Department of Defense, Mr. Chairman. This picture reflects the action taken by Defense on this part of the Army's budget.

Mr. MAHON. Which you think was in error.

General WOOD. I think it was in error. I think what happened, was that the Defense Department decided as part of fitting the appropriation within the budget structure, to eliminate a project in the Army's program. This project, for which there was $44 million in the budget, was for a larger lift helicopter than we have now. When the sum of $44 million was taken out, it made quite a hole in our aviation program.

Mr. MAHON. At a time when we were demanding more and more mobility, why were you unable to hold that in your budget?

General WOOD. Why were we unable? The Defense Department thought that, rather than developing a new helicopter, which is what we planned to do—and we had had contractors' proposals on this—we should modify an existing helicopter to carry a greater weight. That is what we are going to do, and we will reprogram money for that purpose.

Mr. MAHON. Do you think the Defense Department was probably correct in its position?

General WOOD. I think the Defense Department selected a cheaper, shall we say, project by doing it that way. What we will get out of the project we are going to modify is not quite what we want. It will have almost the same lift capability in tonnage—3 tons—but it will not have the configuration which allows us to carry internally the kind of load that we want.

Mr. MAHON. Who made this decision?

General WOOD. To that I will have to use the blanket expression, "the Office of the Secretary of Defense," sir.

Mr. MAHON. Who in the Office of the Secretary of Defense would consider this sort of thing? Would it be Mr. Quarles, Secretary McElroy, or Dr. York? I wonder if Dr. York had a look at this.

General WOOD. No, I would say Dr. York had nothing to do with this at that time, but his predecessor, Dr. Foote, who was Assistant Secretary for Research and Engineering, of course took a look at all of the services' R. & D. programs. Subsequently, of course, they were looked at by other officers in OSD; by the Comptroller's Office, by Mr. Quarles, and by the Secretary himself. I think I could hardly identify exactly where this cut was made.

Mr. FLOOD. In order to avoid duplication and my pursuing the same thing later——

Mr. MAHON. I yield.

Mr. FLOOD. This, Mr. Chairman, I am seriously concerned about. This is what I mentioned yesterday. I saw this cut in that chart, which is why I asked that the chart be brought back, from 543 to 321, and on the aircraft you are away down. What are you doing on the VTOL and the STOL operations? You say you cut the CARIBOU because you are going to try to experiment with it. This deals with the whole question, as the chairman said, of the mobility of the Army in limited war, which I am convinced is going to be it, if any.

This to me is an example, Mr. Chairman, of the subterfuges and the flagrant misrepresentations at the Department of Defense level when they juggle these budgets for all services, particularly this Army budget. It was dishonest and it was meant to be. They know this will be transferred funds. Whoever decided this, as you suspect, knows that this had to take place. This is one of the basic evils in constructing this whole Defense budget at the Defense level with the interjection of the Bureau of the Budget. This is a subterfuge. It is not fair to this committee. It is not honest.

AVRO DEVELOPMENT

Mr. MAHON. Let me ask the next question here.

Is the VTOL plane, which you mentioned being developed by AVRO, on an Army contract?

General WOOD. That is right. That is, it is Army funded. Actually it is an Air Force contract because all of our aircraft procurement goes through either the Navy or the Air Force, single service procurement.

Mr. MAHON. Is this a satisfactory arrangement insofar as this development is concerned, insofar as you know?

General WOOD. I would like to ask General Britton, who deals with that every day, to speak to this. I would say it is sometimes time consuming, but my experience with the Air Force and Navy technicians who work in this field is that they give us excellent service.

General BRITTON. This happens to be joint, speaking particularly of AVRO. The Air Force has an interest of their own. The main problem is that you do have to transfer the funds and the necessary paperwork, so you can always bank on a few months' delay in the letting of the contract.

Insofar as the responsiveness and the value of Air Force and Navy technicians, we are still not really in good condition in the Army to have the wealth of background that their technical people have. So this provides us with this source. There is that one kind of paperwork in getting the contract from ourselves, to give them the money and release it.

Mr. FLOOD. How much conversation have you had with these people on the Troop Carrier Command airlift for Army troops?

General BRITTON. We keep in close touch with the Air Force to insure that Army requirements are made known.

Mr. FLOOD. Will you set forth for us in the record someplace later on what requirements have R. & D. and/or the Army given to the Air Force? What did you tell them you need from now on in for the Troop Carrier Command for troop and hardware airlift for the Army? What did you ask for? What is the status of the conversation? What are you going to get? Put that in the record.

General BRITTON. Very well, sir.

(The information requested is classified and has been submitted separately.)

General WOOD. We will get this for you, but you are a little out of the R. & D. field, Mr. Flood.

The Air Force has the mission of providing airlift for the Army.

Mr. FLOOD. I know all about missions, and I am sick and tired of the Key West Agreement. It was born in sin and it should die that way. I want to know what you are asking for. What are you insisting on? What do you want? What are you asking for? What are you going to get for the Troop Carrier Command? What kind of hardware do you want them to give you?

This is not all the fault of the Air Force.

General WOOD. The Army R. & D. office is not asking for airlift, as such.

Mr. FLOOD. Why?

General WOOD. It is not its job to do so.

Mr. FLOOD. I do not agree with you, but that is the answer.

Mr. SIKES. Do I understand that Army does not tell Air Force what configuration in troop carriers it needs for its airborne operation?

General WOOD. The R. & D. office is not that part of the Army which has the responsibility for troop carrier operations. You are dealing with the operations and planning part of the Army staff. When it comes down to actually testing loads in aircraft, R. & D. does do a tremendous amount of work with the Air Force in making certain that the configuration of our pallets, our packages, our parachute gear, fits into their aircraft.

Mr. SIKES. Are specifications set forth which will be used as a guideline by the Air Force in developing the aircraft which will transport the airborne forces and other air-transportable troop units? I am curious to know whether the Army has any voice in this matter, or whether they take anything the Air Force hands down to them.

General WOOD. No, sir; I think it is not correct to say we take anything that is handed down. Certainly the needs of the Army have been stated to the Air Force.

Mr. SIKES. By whom?

General WOOD. Through the Joint Chiefs of Staff mechanisms, I think, sir.

Mr. SIKES. There seems to be a vagueness about this. Will you provide for us—and I would like it called to my attention when it arrives—specific information about whose recommendation is followed when troop carrier aircraft are devised, and at what point, if any, the Army's recommendations are taken into consideration.

General Wood. Yes, sir.
(The information requested follows:)

QUALITATIVE AIRLIFT REQUIREMENTS

In the development of a new troop carrier aircraft the Air Force first writes a draft "General Operational Requirement." This paper, which contains statements of requirements as to required characteristics, is sent formally to the Army for comment. Army requirements are then considered by the Air Force for incorporation into the final "General Operational Requirement." As development progresses on the aircraft, the Army participates in joint Army-Air Force boards which inspect mockups and resolve development problems. Visits by Army research and development personnel are made to contractor installation to inspect aircraft features of primary interest to the Army, i.e., paratroop doors, troop and equipment seating and loading characteristics, etc. The Army receives one of the production aircraft for Army user tests. These tests are performed in close coordination with Air Force aircraft test agencies. The results of the tests are then sent to the Air Force by the Chief of Research and Development together with any deficiencies and suggested modifications. When the Air Force effects the modifications, the Army often check tests the modified aircraft. For liaison purposes, the Army maintains an airborne-qualified officer at Wright Air Development Center, Dayton, Ohio, and the Air Force has a qualified troop carrier pilot assigned to the U.S. Army Airborne and Electronics Board, Fort Bragg, N.C.

Ideally, Army recommendations and requests concerning qualitative requirements are taken into consideration prior to, during, and after development of Air Force troop carrier aircraft. For several reasons, all Army requirements have not been fulfilled. For example, advances in Army operational concepts and delays in receipt of USAF test aircraft have precluded incorporation of Army recommended modifications in retrofit programs. On other occasions Army requirements have been aerodynamically infeasible. In general, however, the Army is satisfied with the system by which Army requirements are considered by the Air Force during the development of a new troop carrier aircraft.

CONTRACTS WITH FOREIGN FIRMS

Mr. Mahon. The AVRO Corp. is a foreign corporation, is it not?
General Wood. Canadian.
Mr. Mahon. Where is its headquarters?
General Wood. Near Toronto, sir.
Mr. Mahon. Does the Army have other contracts with foreign firms in R. & D.?
General Wood. I am not certain I can answer that.
Mr. Mahon. Supply the information for the record.
General Wood. Yes, sir.
(The information follows:)

CURRENT ARMY DEVELOPMENT CONTRACTS WITH FOREIGN FIRMS

The Army has seven development contracts with foreign firms. Details of these contracts are as follows:

1. Firm: Physikalische-Technische Werkstatten, Prof. Dr. Walter Heimann; Wiesbaden. Location: Germany. Purpose: Development infrared tubes. Date of contract: November 27, 1957; amendment No. 1, October 30, 1958; No. 2, February 4, 1959. Amount of contract: $43,750.

2. Firm: D. Napier & Son, Ltd. Location: London, England. Purpose: Development of a skid-mounted air compressor unit, with Howden compressor, driven by Napier Deltic engine. Date of contract: November 29, 1956; model 1, August 26, 1957; model 2, March 18, 1958; model 3, June 6, 1958. Amount of contract: $254,000; model 3, $30,787 increase.

3. Firm: Tellurometer, Ltd. Location: Capetown, South Africa. Purpose: Studies equipment, and test of airborne and seaborne tellurometer type equipment. Date of contract: March 11, 1958. Amount of contract: Target $195,216, ceiling $224,498 (form IV contract).

4. Firm: Tellurometer, Ltd. Location: Capetown, South Africa. Purpose: Design and fabricate tellurometer systems for measuring distances by micro-

waves (militarized version). Date of contract: June 30, 1958. Amount of contract: $24,476.60.

5. Firm: Tellurometer, Ltd. Location: Capetown, South Africa. Purpose: Design, fabricate, and test portable short range electronic positioning equipment. Date of contract: December 30, 1958. Amount of contract: $146,005.

6. Firm: Tellurometer, Ltd. Location: Capetown, South Africa. Purpose: Develop miniaturized tellurometers. Date of contract: April 30, 1959. Amount of contract: $47,476.

7. Firm: C. I. C. Engineering, Ltd. Location: Oldfield Park, Bath, England. Purpose: Direct molded sole vulcanized bottom footwear studies. Date of contract: April 18, 1958. Amount of contract: $33,300.

Mr. FORD. Will the chairman yield there?

Mr. MAHON. Yes.

Mr. FORD. Is this the corporation which just lost a substantial contract of the Canadian Government for the manufacture of their interceptor?

General WOOD. Yes, the CF–105.

Mr. FORD. Is this a different corporation than AVCO?

General WOOD. This is Avro Aircraft, Ltd., a member of the A. V. Roe group.

Mr. FORD. There is no connection between AVCO here and AVRO in Canada?

General WOOD. Not so far as I know, sir.

VTOL/STOL AIRCRAFT

Mr. MAHON. How much has been spent to date in an effort to develop a VTOL aircraft? Provide for the record the overall Department of Defense cost.

General WOOD. All right, sir.

Mr. FLOOD. And the STOL, at the same time.

General WOOD. All right, sir.

(The information requested follows:)

ARMY

Approximately $36 million have been spent on research test bed air vehicles. Of this total, approximately $20 million were expended on two joint efforts with the U.S. Air Force (XV–1, XV–III), which were initiated more than 10 years ago. Subsequently, a more diversified program was undertaken to investigate a wide range of VTOL principles. These include: Tilting wings, rotating ducted propellors, deflected slipstream, flying platform, ducted fans, and annular jet flow (AVRO). This diversified approach has cost about $16 million over the past few pears. There is an additional $2.5 million planned in the fiscal year 1960 budget to complete successfully and evaluate the results of this research program.

The Army has spent approximately $33.8 million in developing two STOL aircraft. These aircraft are the *Caribou* transport airplane and the *Mohawk* observation airplane. Both of these aircraft are in limited production now.

NAVY

Commencing in fiscal year 1949 and projected through fiscal year 1959, the Navy has expended $35.5 million in the VTOL/STOL program. In addition, the fiscal year 1960 budget before Congress includes $1.2 million for this program.

AIR FORCE VTOL PROGRAM

1. The Air Force VTOL research aircraft development program has investigated several different approaches to vertical takeoff in the X–13, X–14, X–18, and the AVRO project at a cost to date of approximately $25 million.

2. The funding of the XV–1 and XV–3 projects which were conducted jointly with the Army has been reported in the Army statement as approximately $20 million.

3. An additional $6.5 million were spent as the Air Force portion of a joint Air Force-Navy project to develop a V/STOL fighter-bomber which was carried only through the completion of a phase I design and mockup.

Mr. MAHON. In what specific area or areas do you need knowledge not now available to build such an aircraft?

General WOOD. I think we probably will have to supply that, unless General Britton can speak on it.

Mr. MAHON. I think you can speak to it, General.

General BRITTON. Yes, sir, I can.

I would like to discuss first the series of work that we have done in the field of the VTOL. The helicopter itself is one type of a VTOL. We have other propulsion systems. It is in these other systems than the helicopter that we are having to get and are now running through and completing the tests on various configurations and methods of pushing the air down to give us lift.

We have to work this through to try to have the technical data worked out to see which ones give us the best method, whether we are trying to get lift or weight-carrying or whether we want to be able to move along. We must study the data coming out of the wind-tunnel work and flying tests as to which gives us the most efficient way of doing this. There are the problems of stability and control. They have different methods of solving this.

Really you might say we practically have the data now, but we do not really have it worked down by the technical people to the point that they can advise us, "If you want to get the most efficient weight-carrying with slow speed, this is the configuration. If you want to get better speed, then you use this other propulsion system."

Mr. MAHON. When we speak of VTOL, we mean vertical takeoff and landing?

General BRITTON. That is correct. In other words, you do not have any ground roll.

Mr. MAHON. Do you foresee a vastly expanded and improved system of VTOL in the Army and probably in civilian life in the next 10 or 20 years? What is the future of this?

General BRITTON. Yes, sir, I think you will see a great deal of it, because it relieves you from the complications of the hard bases and facilities, and because of their flexibility of operation. You do pay a price for power, because you are pulling yourself straight up. So for economical civilian application, we will probably go more to the STOL, short takeoff and landing, where we reduce the requirements rather than completely eliminate them.

Mr. MAHON. You say the VTOL takeoff requires a lot of power?

General BRITTON. Yes. You are pushing yourself up by your bootstraps.

CARIBOU AIRCRAFT

Mr. FLOOD. Can we have a minute again to review the characteristics of CARIBOU?

General BRITTON. Yes, sir.

Mr. FLOOD. We have had it, but I would like to be refreshed on the characteristics of the potential and mission of the CARIBOU. I think you told us an hour ago that it goes into operational tests when? Next month?

General BRITTON. We expect to get our first flight article within the next month or two. In fact, we would have had it this month

but they had an accident with our model before the company finished it and turned it over to us.

Mr. FLOOD. Strike out the word "operational." I did not mean operational. What is the word I want? Applied research? It is beyond that.

General BRITTON. This is the actual test prototype.

Mr. FLOOD. The Army is going to test CARIBOU next month?

General BRITTON. We will start next month.

Mr. FLOOD. Will you give us just a minute on the configuration and characteristics.

General BRITTON. It is a 3-ton light transport. That is, it will carry a 3-ton payload. The aircraft has an empty weight of approximately 15,000 pounds, a gross weight of 26,000 pounds. It will have a range and payload of 174 nautical miles with 7,400 pounds, to give you a feel of the range and payload.

Mr. FLOOD. 174?

General BRITTON. Nautical miles, carying a payload of 7,475 pounds.

Mr. FLOOD. How many troops will it carry with light hardware?

General BRITTON. Roughly 30.

Mr. FLOOD. Advanced rifle echelons?

General BRITTON. Yes, sir. This would be a rifleman with his pack and rifle.

Mr. FLOOD. Thirty?

General BRITTON. Yes, sir.

Mr. FLOOD. What will that land in? What kind of ground? Will it land in a grass-plowed field?

General BRITTON. Yes, sir, it will land in quite rough fields. It requires around 800 to 1,000 feet to clear a 50-foot obstacle, depending on your gross weight, of course. This means that 400 to 500 feet of ground roll is required. In other words, the higher the gross weight——

Mr. FLOOD. Is this the kind of aircraft I could use if I have an Air Carrier Command and if I have sufficient airlift, which I do not have, but if I had it, I could take airborne divisions 3,000 or 4,000 miles——

General BRITTON. No, sir.

Mr. FLOOD. Wait a minute.

And land them at hardened bases? Can I fly them to firing areas with this kind of aircraft, 150 miles into the battle zone and land in in desert and rough territory?

General BRITTON. Yes, sir.

Mr. FLOOD. Without crashing them. I can take them off and bring them back.

General BRITTON. Yes, sir. Defining the type of landing field: this would be a field which has not been surfaced, which has not been prepared. Obstacles would not exceed 6 inches in height.

Mr. FLOOD. A rough landing area.

General BRITTON. That is correct, sir, but not a plowed field which is like a wheatfield which has been completely plowed over. It is pretty rough.

Mr. FLOOD. I would expect people to be in there to tell me where I am going to land. I would have ground forces in there telling me where to come down.

General BRITTON. Correct, sir.

Mr. MINSHALL. What is the speed of the ship? How is it powered, its other general characteristics, General?

General BRITTON. Its present configuration has two radial aircraft-type engines, and they are known as R 2,000. The maximum cruise speed is 160 knots at 5,000 feet.

Mr. MINSHALL. It carries, then, actually only about 2 hours' worth of fuel.

General BRITTON. That again is for your payload, yes, sir. If you go down to a 5,000-pound——

Mr. MINSHALL. I mean it will carry 2 hours' worth of fuel with the maximum payload.

General BRITTON. Yes, sir. That is the order of magnitude.

Mr. MINSHALL. Is it a high-wing or low-wing craft?

General BRITTON. High wing, with a ramp loading from the rear.

Mr. FLOOD. I do not need a hard surface landing and I do not need a control tower?

General BRITTON. No, sir. In our first demonstration, this plane was landed at Fort Myer on the same field where the original Army plane we bought from the Wright Brothers took off and landed.

Mr. FLOOD. Is there a reinforced floor in this plane?

General BRITTON. Yes, sir. It is built to carry small vehicles.

Mr. FLOOD. You open up the tail. What is the heaviest piece of hardware you can put in it, one single heavy piece of hardware—an antitank gun?

General BRITTON. No, sir. The self-propelled gun is too big. It would be the quarter-ton or three-quarter-ton truck size, in that range, because of the construction of the fuselage itself plus the gross weight capabilities of the airplane.

For your information, I have one picture here. I do not know whether you can see it.

Mr. FLOOD. Yes. We are getting pretty close to something now for the first time in 100 years.

Mr. MINSHALL. What is the landing speed, that is, as it comes over the fence?

General BRITTON. Let me check that, sir. It is pretty slow speed for this type of plane. Its stall speed is 55 knots.

Mr. FLOOD. It carries no armament, does it?

General BRITTON. No, sir.

Mr. FLOOD. It is pretty close. That is 3 tons.

General BRITTON. Yes, sir.

I do not have the exact landing speed, but it is somewhat above the stall speed.

VTOL AIRCRAFT

Mr. MAHON. In connection with the vertical takeoff and landing aircraft, I would like to ask in what specific area or areas do you need knowledge not now available to build such an aircraft. And I would like you to provide information in response to this question: How does the fiscal 1960 budget effort in this field compare with efforts in prior years, so we will have in one package more information?

General WOOD. We will provide that.

Mr. FLOOD. You are speaking of VTOL, not the Caribou?

Mr. MAHON. That is right. I was trying to complete the subject on the VTOL.

(The information requested follows:)

DEVELOPMENT OF VTOL AIRCRAFT

1. There are several areas where additional study and experimentation are needed in order to develop a VTOL aircraft:

(*a*) To justify and prove theoretical data by flight test. This work is in progress at this time. VTOL air vehicle test beds, sponsored by the Army, are either being flight tested or will begin flight tests before the end of fiscal year 1959. The NASA is assisting the Army in this program.

(*b*) To determine environmental problem areas with respect to operating VTOL air vehicles under battle area conditions. Little is known at this time as to the impingement effects of the vertical column or sheet of high velocity air when operating within the ground cushion over various types of terrain. Noise problems associated with VTOL type air vehicles require further investigation. It is planned to investigate these problems later this year by using our various VTOL test bed air vehicles to include the principle or combination of principles of attaining the VTOL capability. This problem is under study and it is considered that sufficient knowledge on this subject will be available later this year to complete this work.

(*c*) To determine the most economical and efficient propulsion-lift system for each category of VTOL air vehicle. This problem is being studied.

2. The Defense budget for fiscal year 1960 provides $24.1 million for the Army aircraft research and development program. Prior year fiscal efforts (fiscal year 1956 through fiscal year 1959) have averaged $50.3 million for the Army program directed toward providing STOL/VTOL aircraft.

CARIBOU AIRCRAFT

Mr. MAHON. Are there any further questions on the Caribou? We shall take them at this time, if there are.

Mr. FLOOD. I would like to say, Mr. Chairman, this is one of the best R. & D. presentations I have seen in a long time.

Mr. MAHON. I would like to concur in what the gentleman from Pennsylvania has said. It is down to earth, informative, and helpful. Certainly it is the minimum program, I should think, for R. & D., Army.

General WOOD. Thank you sir.

Mr. MINSHALL. Before they finish, on the cost of the Caribou, what is the unit cost of one of these?

General WOOD. I think General Britton has that, sir.

General BRITTON. We have it.

General WOOD. It is about $200,000 in production, I think. He will look it up.

General LINCOLN. The cost of the Caribou, the early models, will be about $870,000, and under continuous production we expect it to get down to about $225,000.

Mr. MAHON. Thank you very much, gentlemen.

WEDNESDAY, APRIL 22, 1959.

AFTERNOON SESSION

Mr. SHEPPARD. The committee will come to order. It is my understanding that you have a short film that you would like to present to us.

NIKE ZEUS

General WOOD. Yes. As I told the chairman just before recess, I put together some film which was available. It has not been prepared for any particular purpose. Some of it is repetitious of the presenta-

tion of last year, but in view of your interest in ZEUS I thought that it would be worthwhile to refresh your minds. Some of the film is new, showing hardware components on which we now have work going on.

(A short film was shown the committee.)

General WOOD. The purpose of that film was to give you an idea of the fact we are in hardware development. I could speak about the system if you want me to, or I can answer questions.

Mr. SHEPPARD. I have a series of questions Mr. Mahon wants answered for the record. I will read the questions and you can supply the answers for the record.

It is reported that certain small electronic items, needed in great numbers even for test purposes in the NIKE-ZEUS program, are now being produced largely by hand. Would it be helpful for this program if certain parts could be put into production early, and if so, what would be the cost of doing so?

(The information requested is classified and was furnished to the committee.)

Mr. SHEPPARD. When did the NIKE-ZEUS project start? Is this an extension of NIKE-HERCULES? How much money will have been allocated to this project by the end of fiscal year 1959? What do we have in hand to show for these expenditures?

(The information requested is classified and has been furnished to the committee.)

Mr. SHEPPARD. What are the major components of the NIKE-ZEUS? Have any full-scale components of the NIKE-ZEUS system been built and tested? Has a prototype system of any kind been built? When will the NIKE-ZEUS system actually be tested against a ballistic missile? Where?

(The information requested is classified and has been furnished to the committee.)

Mr. SHEPPARD. What is the planned composition of a NIKE-ZEUS battery? How many incoming ICBM's should it be able to handle at the same time?

(The information requested is classified and has been furnished to the committee.)

Mr. SHEPPARD. How will the NIKE-ZEUS system determine whether an incoming ballistic missile is a decoy or a warhead?

(The information requested is classified and has been furnished to the committee.)

Mr. SHEPPARD. Is there a possibility of radiation fallout problem from the detonation of our own nuclear warheads so relatively close overhead? Might a radiation shielding (Argus effect) then disrupt communications and radar capability for further defensive efforts?

(The information requested follows:)

Local fallout is a function of the amount of dirt and water mixed with the radioactive material of the detonation. In air bursts of weapons, little fallout occurs since the radioactive products are dispersed over a large part of the atmosphere. Argus effect cannot be considered applicable to tactical weapons because of the influence of atmosphere on the range and nature of the electrons released. Within the atmosphere, the range of communication disturbance, a function of electron release, is limited to the area of the nuclear detonation. Argus effects on communications and radar is classified and is being provided the committee separately.

(Additional classified information was furnished separately.)

Mr. SHEPPARD. How many NIKE-ZEUS batteries would be required to defend the continental United States against ballistic missile attack? What would be the total cost? When could this capability be achieved?

(The information requested is classified and has been furnished to the committee.)

Mr. SHEPPARD. In the event of a 300–400 ballistic missile attack against the United States, employing decoys and perhaps electronic countermeasures, how many could the NIKE-ZEUS batteries reasonably be expected to destroy? What is the probability of achieving that figure?

(A classified statement was submitted.)

Mr. SHEPPARD. Does the NIKE-ZEUS have any growth potential to, attack incoming ICBM's farther away than is presently contemplated? If so, what modifications or new developments would be involved. How would NIKE-ZEUS be coordinated with the BMEWS and SAGE systems? Will NIKE–ZEUS be dependent on SAGE? If not, will there be a requirement for another type of SAGE system on a smaller scale?

(The information requested is classified and was furnished to the committee.)

THREE SERVICES RDT&E APPROPRIATIONS COMPARED

Mr. SIKES. The Air Force and the Navy's research, development, test and evaluation budget is at about the same dollar level as is the Army's, although the total budget for each of those services is significantly higher than is the Army budget. Why is the Army devoting more of its resources to research, development, test and evaluation percentagewise, than either the Navy or the Air Force?

General WOOD. I have some facts on that.

I agree that the figures as presented to you for the 1960 budget for the three services would seem to indicate the conclusion that you have drawn. But I would point out that when this appropriation was directed by the Secretary of Defense, it was agreed that it was quite possible that not everything would be transferred this year.

I have a quotation from the guidance provided by the Assistant Secretary of Defense, Comptroller, in November 1958, which said:

> Transfer of test and evaluation items from the procurement appropriation to research, development, test and evaluation will be accomplished in two steps. One, identify for removal from procurement appropriations, items which are clearly of a research and development nature. Two, identify any major items of a research and development nature which, because of the funds involved, or for other special reasons, require the decision by the Secretary of Defense as to whether the items should be transferred to the research, development, test and evaluation appropriation, or should remain in the procurement appropriation.

In the case of the Army, we found very few items which were in a doubtful category. As I said this morning, we estimated somewhere probably in the neighborhood of $38 million remained to be transferred. It is a suspect figure and it may be twice that.

We know, however, in the case of the Air Force and the Navy, both had certain programs which, at the time this appropriation was established, were still in a questionable status so far as the Secretary of Defense's decision was concerned, and information available to me indicates that a considerable amount for fiscal year 1960 remains in

appropriations other than research, development, test and evaluation. Specifically, insofar as the Air Force is concerned, my figures indicate that approximately $1.5 billion of what I would consider research, development, test and evaluation expenditures are not in this appropriation. I am unable to find in the appropriation for the Air Force such items, for example, as all or part of the funds for the B–70, the F–108, the TITAN, the ATLAS, and the MINUTEMAN. Those are typical.

I think, then, that because of the lateness of decisions, not all of those amounts were transferred. Similarly in the case of the Navy, I can cite items which do not reach that great a total. My total is on the order of $280,000.

The point that I am making is, sir, from a practical and realistic standpoint the Army's percentage of its budget devoted to research, development, test and evaluation is in our opinion on the order of 10.6 percent; for the Air Force, 13.8 percent, and for the Navy, 10.3 percent.

INFRARED DETECTION

Mr. SIKES. We are placing considerable emphasis on infrared detection on the battlefield. It is a very fine addition to detection devices. However, I note, as is so frequently the case, there is a defense against infrared detection devices. I am talking about aluminum emulsion, aluminum chaff, or similar items which may be dispersed in an area and at least partially block infrared detection.

How serious is this defense against infrared detection devices, and what, if anything can be done to overcome the measures that I have mentioned?

General WOOD. May I ask General Britton to respond? May I say as an opening statement, the situation you have described is certainly true in part. I will say that our work has been along the lines of not only testing what we are using, but attempting to put up against it devices to counter it. As of the moment, my general impression is that we are ahead in this game.

Mr. SIKES. The detection is better than the defense against detection?

General WOOD. Yes.

Mr. SIKES. Does anyone want to comment any more?

General BRITTON. I would. I think that is a very true statement. I am speaking now of infrared against ground targets, and in the ground environment this means that the countersystems are pretty much the same as we have faced in the past in the smokescreen. It does degrade it, but we do not believe the enemy will be able completely to flood us at all times. We do not depend on infrared completely anyway, because it is just one of our means of gathering information, or indications from which we produce intelligence. We are also depending on every other means we can think of, such as radar and visual observation, so we are not taking a position where we say we have complete dependence on infrared coming through.

Mr. SIKES. There has been some discussion of the development of another new rifle. A more modern rifle has been adopted recently by the Army with a new round of ammunition but actually these possess only minor modifications of the time-honored weapons that the Army has had and which still are used.

Now, what emphasis are you placing on the development of a significantly new lightweight weapon for the Army which utilizes a new concept of ammunition in that the round is much smaller than the current round and is projected at a much greater velocity than the current round? The rifle, I understand, can be loaded with several hundred rounds if desired rather than 20, and even when loaded with a great number of rounds will be lighter than the present rifle.

Can you tell us anything about that and about the emphasis that you are placing on it in research and development?

General WOOD. The Army has a program known as the "SALVO" program, which is a word that does not necessarily mean anything, but is applied to this development.

It has two parts, really. They are both designed toward determining the optimum round for the job. Once the optimum round is determined, then we can determine the weapon that will fire it.

We have been working in calibers from .22 to .258 specifically as an area that seems to offer the greatest promise in giving us the velocity we want and the lethality we desire.

The other part is the bullet itself. There, we are following two lines of development. Both use a considerably higher velocity than we use today. Both, as you say, will enable us to carry considerably more ammunition in a bandolier, or a magazine.

We have tested several rifles made by Winchester, and by Fairchild, if I recall, to determine whether our idea of the optimum round can be tied to those particular rifles.

These particular commercial models for the moment appear to have some disadvantages from a military standpoint, but they offer the kind of thing we are looking for in that they are in the weight range of 5 to 6 pounds. This would give a considerable weight advantage over either the M–1 or the M–14.

Mr. SIKES. Is this something that has just been discussed and may come up again 20 years from now, or will this be actively pursued? It seems to have definite advantages.

General WOOD. It is being actively pursued. It is a program that we have worked on for roughly five years. The final tests are scheduled for late this summer or early fall. At the end of those tests, we expect to have a recommended position from the developing agencies for the users to look at and the staff to determine.

Mr. MINSHALL. What type and how long have these commercial modifications been on the market?

General WOOD. I am unable to answer that, but I think the information is probably available.

General BRITTON. The weapons we actually tested are not on the market. They were built for us by commercial concerns under their concept. The first test of one of those, which was 2 years ago, was in a larger caliber. Last year we tested some other models in the smaller calibers.

Mr. SIKES. What is the propellant used in the smaller caliber? Is it a modification of the existing powder charges?

General BRITTON. It is basically a double-based propellant. It is nothing startling. I would not be able to give you the exact chemical compound.

Mr. SIKES. You said in caliber .22 to caliber .258. Did you also mean to include the considerably smaller Flechettes which are in the neighborhood of .09 caliber?

General WOOD. We have worked all the way from perhaps .09 up through caliber .30, or 7.62 millimeter. I only indicated .22 and .258 because the work has, so far, pointed to that area as a solution.

Mr. SIKES. It seems a rather interesting point that through history we have gradually reduced the size of the round of conventional ammunition. We started out with about caliber .70 in the Revolutionary War and we have gradually been reducing this so that now we are talking about caliber .22. Few people think of .22 caliber as a military weapon but when it has enough velocity it becomes a powerful weapon.

General WOOD. That is right.

Mr. SIKES. Apparently the small round propelled at high velocity has a more destructive effect upon tissue than the larger round with which we are more familiar.

General WOOD. That is my understanding.

M–151 TRUCK

Mr. SIKES. Tell me something about the new jeep. Who is building it and what is it like? I am speaking now of the one under procurement, not the one still under test.

General WOOD. I asked General Lincoln and General Engler of the Logistics Office to accompany me.

Mr. SIKES. Tell us what the new jeep is like and whether it is a minor modification of the present jeep, and who is building it.

General ENGLER. The new jeep, the M–151, is now under procurement. Production quantities are now under procurement.

Mr. SIKES. How many?

General ENGLER. The quantity is 4,050.

Mr. SIKES. Is this the first year?

General ENGLER. This is the first year; yes.

Mr. SIKES. From whom?

General ENGLER. The procurement is being conducted on a competitive negotiation basis, sir.

Mr. SIKES. Then they are about to be placed under procurement. Who developed it?

General ENGLER. The vehicle was developed for the Army by the Ford Motor Co.

Mr. SIKES. Do you have a picture of it? I am still trying to find out if it is the same as the old jeep with a new big set of tail fins on it.

General ENGLER. I have a picture here. Being a wheel-type general-purpose vehicle, on the face of it, it does not look too much different from many vehicles of similar characteristics.

Mr. SIKES. This looks about like all the other jeeps that I have seen. What is the difference?

General ENGLER. The basic differences are that the M–151 has 36 percent more cargo space than the present M–38–A–1. Its curb

weight is some 451 pounds less than the M–38–A–1. It has improved cross-country mobility by reason of its independent suspension, and it has greater stability on side slopes. The fuel consumption on the new vehicle is 25 to 50 percent more economical than that of the M–38–A–1. It is also superior in durability.

Mr. SIKES. How long was this new vehicle tested?

General ENGLER. The first development contract was placed for this vehicle in 1952.

Mr. SIKES. How many of them have been built and tested?

General ENGLER. I will have to furnish the exact number for the record. My memory says it was approximately 10 vehicles that were built and tested.

Mr. SIKES. I think that is right, 10 or 12 have been built altogether. Were those vehicles built in 1952?

General ENGLER. No, sir; not all were built in 1952, sir. The development contract was started in 1952 and the first vehicles were built sometime after the development contract started.

Mr. SIKES. Have there been modifications since the 1952 vehicles?

General ENGLER. Yes. The vehicles initially built were tested and during the period of test there were certain deficiencies uncovered, and the vehicles were modified to correct those deficiencies and there have been retests.

Mr. SIKES. Have there been retests of all the modifications?

General ENGLER. Retests to prove out the correction of the deficiency, sir.

Mr. SIKES. Can you get a complete usability test on 10 or 12 vehicles?

General ENGLER. I believe we can over this period of time, sir. We can certainly get complete tests insofar as development and engineering are concerned.

PLATFORM VEHICLES

Mr. SIKES. What happened with the plan to develop a new vehicle called the mechanical mule which was demonstrated to the committee?

General BRITTON. I think that I had better take that.

Mr. SIKES. We are now talking about research and development, are we?

General WOOD. Yes.

Mr. SIKES. How long has the mechanical mule been under development?

General BRITTON. We have the mule, which is the small half-ton vehicle which we have in production, and in tactical units, the 82d airborne being one of the units.

Mr. SIKES. That one is in production. That is the open-platform type that the man sits on one side?

General BRITTON. That is correct.

The convertible mule is the one that you are referring to.

Mr. SIKES. That is not the kind I grew up with, but I am familiar with this new kind, too.

General BRITTON. The vehicle in question is called the convertible mule and sometimes a platform vehicle. We did some preliminary testing on one of these which was built for Ordnance. We found

that we had 54 deficiencies. Those were brought to the attention of the manufacturer. We are procuring four others incorporating the modifications.

Mr. SIKES. Let us talk about the mechanical mule. How many of those are under procurement?

General ENGLER. Going to the mechanical mule, sir, we have bought a total of some 1,747 of which 1,400 are for the Army and the remainder for the Marine Corps.

Mr. SIKES. What is the delivery schedule on those? When were they bought?

Put that in the record.

(The information requested follows:)

PRODUCTION OF MECHANICAL MULE (CARRIER, LIGHT WEAPONS, INF., 4x4, ½-TON M274)

A contract for 751 units was placed in fiscal year 1956. This was increased by 985 units in fiscal year 1957 and by 11 units in fiscal year 1958. Of the 1,747 contracted for, 1,539 were delivered through March 31, 1959, and the balance of 208 are to be delivered in April and May.

Mr. SIKES. Are you procuring more out of this year's budget?

General ENGLER. We are procuring none in the fiscal year 1960.

Mr. SIKES. Is that all that you will need?

General LINCOLN. I do not have the total requirement here.

Mr. SIKES. Put that in the record.

(The information requested is classified and has been submitted separately.)

Mr. SIKES. What is the convertible mule?

General BRITTON. It is a larger vehicle of about the same general design of the platform structure. The curb weight of the larger vehicle is 1,500 pounds, or a gross vehicle weight of 3,000 pounds; in other words——

Mr. SIKES. How does that compare with the jeep that you are buying?

General BRITTON. The jeep that we are buying is rated with a payload of approximately 800 pounds, but the jeep we are buying is not being bought primarily as a cargo mover. It is used also for radio carrier, command, control, and liaison vehicle, and a reconnaissance vehicle.

Mr. Sikes. Would the convertible mule not be useful for those activities?

General BRITTON. For some of them; yes.

Mr. SIKES. Not all of them?

General BRITTON. Not all, no.

Mr. SIKES. Which one would it not be useful for?

General BRITTON. The command control vehicle not quite as well, where you have the radio mountings, because they would be above the platform.

Mr. SIKES. Any others?

General BRITTON. Without further test I could not say until we have actually tried it.

Mr. SIKES. What is the comparative cost between the improved jeep, the mechanical mule, and the convertible mule? Supply that for the record.

(The requested information follows:)

Unit costs

M151 ¼-ton truck	$3,300
Mechanical mule	2,150
Convertible mule	[1] 3,000

[1] Unit cost of service test items of $101,500 would be reduced considerably in quantity production. The $3,000 estimate is the best estimate currently available.

Mr. SIKES. What is the comparable cost of development? How much did you pay to develop the improved jeep?

General BRITTON. I do not have the figures with me.

Mr. SIKES. Provide that for the record, and the cost of development to the Department of Defense for the mechanical mule and the convertible mule.

General BRITTON. Yes.

(The information requested follows:)

Development costs of light tactical vehicles to date

M151	$5,313,460
M274	700,000
XM445	315,000

Mr. SIKES. What is the problem with the convertible mule?

How many have you tested?

General BRITTON. We are only working with the original one that was built.

Mr. SIKES. Who built it?

General BRITTON. The Willys Motor Co.

Mr. SIKES. Does the Willys Motor Co. also build the mechanical mule?

General BRITTON. Yes.

Mr. SIKES. Do they have the production contract on it?

General ENGLER. They did, sir.

M151 TRUCK PROCUREMENT

Mr. SIKES. What is in the present budget for the procurement of the improved jeep? How much is in the budget for that and for how many?

General LINCOLN. The budget for procurement on the improved jeep calls for 3,400 jeeps at a total of $11,220,000.

COMPARATIVE CHARACTERISTICS OF LIGHTWEIGHT VEHICLES

Mr. SIKES. I would like to have a table prepared for the record showing the characteristics of each of these three vehicles, and in addition to the items that I have listed, the cost of development to the Government, the anticipated unit cost under producion, and the anticipated gasoline mileage, the weight-carrying capacity, or cargo-carrying capacity, the estimated uses, and the ability to negotiate terrain, if there is any difference.

(The information requested follows:)

Comparative characteristics of lightweight vehicles

Characteristics	M–151, improved	M–274 (mechanical mule)	XM443E1 (convertible mule)
Weight, curb	2,250 pounds	925 pounds	1,500 pounds.
Payload	800 pounds	1,000 pounds	Do.
Length	132 inches	118 inches	120 inches.
Width	63 inches	49.5 inches	60 inches.
Shipping cube	255 cubic feet	77 cubic feet	115 cubic feet.
Cargo area	9 square feet	32 square feet	30 square feet.
Maximum speed	65 miles per hour	25 miles per hour	50 miles per hour.
Gradeability	60 percent	60 percent	60 percent.
Suspension	Individual coil spring	None	Individual torsilastic.
Fuel consumption	15 miles per gallon	10 miles per gallon	12 to 15 miles per gallon.
Comparative off-road capability.	Approximately equal	Approximately equal	Approximately equal.
Cost of development	$4,700,000	$700,000	$365,000 (to date).
Production cost	$3,300	$2,150	Unknown.
Durability	Excellent	Fair	Do.
Uses: [1]			
Command	Yes	No	Yes (limited).
Cargo	Limited	Yes	Yes.
Liaison	Yes	No	Yes (limited).
Radio and communications.	do	do	Do.
Reconnaissance	do	do	Yes.
Weapons carrier	do	Yes	Do.

[1] The ¼-ton 4 x 4 truck M–151 is a utility vehicle used primarily for command, liaison, and communications. The ½-ton 4 x 4 carrier, M–274 (mechanical mule) is a load and weapons' carrier for use in forward areas to take the load off the airborne infantryman's back. It is a special purpose vehicle. The ¾-ton truck, 4 x 4 XM443E1 convertible mule is being developed to test a new concept. It has attractive feature in lightweight, compactness, and versatility; however, its use in the command, reconnaissance, and liaison roles may be limited by the capability to mount radios. Test will show the versatility, utility, and ease o maintenance features of the convertible approach.

UNIT COSTS

Mr WEAVER. The unit cost of those would run in excess of $3,000; is that correct?

General LINCOLN. $3,300.

Mr. WEAVER. For a jeep.

Mr. SIKES. It is a lot more than you would pay for one at a dealer's. I presume that this is a special type of jeep, but you will need to elaborate on that for the committee purposes.

Mr. FORD. For each of these three items will you indicate whether in each case the company that has developed it assigned its proprietary rights to the Government? I know in the case of the M–151 they did. I do not believe they did in the case of the mechanical mule. I do not know whether they have or have not in the case of the convertible mule. But let us be specific in the record as to whether the developing company has, or has not, assigned its proprietary rights.

Mr. SIKES. And I would like to have a careful statement showing the reasons for the apparently high cost of the improved jeep.

(The information requested follows:)

COST OF M–151 ¼-TON TRUCK

The cost of the M–151 can only be considered high when compared to the cost of the vehicle it will replace, namely the M38A1.

The estimated cost of the M–151 is $3,300 compared to the estimate that it would cost $2,500 to produce the M38A1, if it were in production. This comparison is not valid because the M–151 is not a modernized version of the M38A1 but is an entirely new vehicle. It has individual wheel suspension; a unitized frame and body construction; newly designed economical engine, brakes, and transmission; and uses larger quantities of light metals. It is greatly superior

to the M38A1 for airborne operations as it saves 1,600 pounds when rigged for drop. It is believed that with continued production the cost of the M–151 can in the future be reduced below $3,000.

PROPRIETARY RIGHTS

The Army has the right to have any qualified company produce the M–151 ¼-ton truck and the mechanical mule for military use but has not obtained, as yet, this right for the convertible mule.

COST OF M38A1 JEEP

Mr. WEAVER. Could you give me an estimate as to the unit cost of jeeps prior to the procurement of the type we are discussing?

General ENGLER. The last procurement of the M38A1, the old jeep, was in 1953, and the procurement at that time was approximately $2,000, sir, a few dollars under $2,000.

I do not know what that vehicle would cost today.

Mr. WEAVER. It might be well for the record to show what it would cost.

Mr. SIKES. Will you provide that for the record?

(The information requested follows:)

ESTIMATED COST M38A1

It is estimated that, if the M38A1, ¼-ton truck was being produced in quantity, its current unit cost would be approximately $2,500. The M-151 type currently in the Army procurement programs costs approximately $3,300.

AWARDING OF CONTRACT

Mr. SIKES. Tell me about the manner in which you propose to award this contract. Is it going to be a competitive bid or a negotiated bid?

General ENGLER. This is a competitive negotiation.

Mr. SIKES. Involving how many companies? How wide is the distribution of the specifications and the invitations to bid?

General ENGLER. The invitations to bid have been distributed to all companies who have indicated an interest in offering proposals on this particular procurement.

Mr. SIKES. How many are you now negotiating with, or have you reached that stage?

General ENGLER. Proposals are not yet due in, sir. The companies asked for an extension in order to submit their proposals.

I would expect we would have between five and six proposals for this procurement.

Mr. SIKES. Will you provide the committee with that information when it is available?

General ENGLER. I will, sir.

(The information requested will be furnished to the committee on or about May 15, 1959.)

RIFLE DEVELOPMENT

Mr. RILEY. General, a few minutes ago the gentleman from Florida discussed with you the possibility of developing lighter and more accurate and more powerful small arms.

General WOOD. Yes, sir.

Mr. RILEY. How much money is being spent on that program? I gathered not too much emphasis was being placed on it.

General WOOD. It is not a large amount, sir. I think I have it here.

In fiscal year 1960 we have a total of $9.1 million. That is being spent not only on rifles, but on the entire infantry weapons program.

That includes, not only the salvo program which I described but mortar development and mortar ammunition, machineguns, and antitank weapons in the form of the——

Mr. RILEY. I would like a breakdown for the record, because it seems to me the program is moving slowly and there is not enough emphasis being placed on it. I think it is vital for a modern army to have a light weapon so they can carry a lot of ammunition.

(The information requested follows:)

In fiscal year 1960, $2,185,000 has been programed for the development of the rifle and its associated ammunition.

Mr. FLOOD. Ask if they are buying wheels for the 45 automatics this year.

Mr. RILEY. Are there any rifles being developed other than those which have been in use for some years?

General WOOD. The M–14 is going into procurement this year. I think logistics testified to that earlier.

The M–14 is a new rifle with a NATO cartridge in 7.62 millimeters.

Mr. RILEY. If this other development had gone along a little faster you might not want to buy those, would you?

General WOOD. I think we would be unwilling to say we would have the answer firmly on another ammunition or another rifle at any particular time. Small arms development is slow, amazingly slow.

Mr. RILEY. Is that not because we have not been placing the proper emphasis on this? We have been devoting our energies in other directions instead of that.

General WOOD. I am not certain that more money would necessarily expedite the program. There is not a tremendous industry in this area. They are artisans, the people who make and develop small arms and ammunition.

The real artisans and craftsmen in the trade are few in number and you do not necessarily get more effort by putting more money on it.

Mr. RILEY. It may not necessarily take more money, but if they thing the Army is not particularly interested and pretty well satisfied with what they have they will not put much effort into it regardless of the amount of money.

General WOOD. I would say the Infantry would like very much to get a lighter rifle.

Mr. RILEY. I am sure they would.

Mr. FLOOD. Let me tell you something. After the Lebanese affair I sat at a dinner party in this city some time later.

At that dinner party there were six military attachés of six foreign governments. They all sat around the same table with me in the corner talking about this business. These are pros, good men.

I asked them about this business of comments in the area of our sidearms and rifles when they appeared on the beaches.

They told me it was their considered and unanimous judgment that in the opinion of many of the Arabs in that area it was the laughing stock of the entire basin and that guerrillas firing on our occupied

territories, sniping and not trying to hit anybody but causing disturbances, would display in bazaars compared to ours side by side with the people to see better rifles and better side arms than the Marines and the Army had.

Did you ever hear that story?

General Wood. No, sir; but I do not doubt its validity.

Mr. Flood. Sure you do not doubt its validity because these fellows are professional soldiers just as you are. They do not play one side or the other. They are pros.

They told me what their considered opinion was, which is the opinion of their government.

Mr. Sikes. They already had in their possession rifles which are common to most other armies of the world and which are generally similar to the rifle which we are just now beginning to buy in token quantities.

Mr. Flood. They had irregulars coming down from the hills circling these areas shooting over their heads and creating irritation, and they would come into town and show rifles against our rifles. They were better rifles, and even the natives knew it. It was a barroom joke.

General Wood. That could be, Mr. Congressman. It would be interesting to know——

Mr. Flood. Whether or not they could use them I don't know, but there they were.

General Wood. It would be interesting to know whether we are comparing, shall we say, specially made rifles of a small quantity——

Mr. Flood. I am not talking about your grandfather's tools but hardware for troops and guerrillas.

General Wood. It would be interesting to know whether they could be made in mass production.

Mr. Flood. They were made in mass production and you and I know where they came from and where they got them.

General Wood. It also would be interesting to know why they steal ours every time they can do it.

Mr. Flood. Because they want all they can get their hands on, whether they come from you, Russia, or Czechoslovakia. You knew the answer to that yourself; did you not?

General Wood. That is right.

Mr. Riley. What is the prospect of intensifying the development of better small arms and proceeding with it at a more rapid rate? I do not necessarily mean spend more money but putting more emphasis on it. If it will take more money, all right.

You will have to transport your troops, especially your paratroopers, in the air. They have to have light and efficient arms.

General Wood. There has been considerable interest in this area since General Clark arrived at the Continental Army Command. He is quite interested in it.

As a result of that interest, several conferences have been held in the last 6 months which have in fact expedited the program and we expect to get a reading on its results by late summer or early fall.

What we do after that will depend on what we learn at that time. However, the program is designed to produce answers by that time.

Mr. Riley. I hope you will not let it lag because our people, in my opinion, are just as smart or smarter than anybody else, and if they

make up their minds they will develop a small modern weapon they can do it and the rest of the world will be trying to get them.

CHEMICAL AND BIOLOGICAL WARFARE

Mr. SIKES. Are there any restrictions on the development of C. & B. warfare agents and defenses other than monetary?

General WOOD. Any restrictions on the agents in which we can put effort?

Mr. SIKES. Or on the defenses against those agents other than budgetary restrictions?

General WOOD. I know of none.

Mr. SIKES. In other words, you have not been told what you can do and cannot do in that field other than by money limitations?

General WOOD. I know of none so far as R. & D. is concerned.

Mr. FLOOD. There never has been any, has there?

MACE MISSILE

How many conversations did you have or have any of your predecessors, if you know, had with the Air Force with reference to the ground to ground missile MACE?

I know how they got into this. I know all about that ridiculous and stupid Wilson's memorandum on restriction and jurisdiction by distances of ground artillery and ground to ground. I know all about that discredited document, but at that point or any other point have you been in conversation, did you ask to get into conversation, or were you invited to discuss with the Air Force the ground to ground MACE?

General WOOD. So far as I am personally concerned the answer is "No", sir. I am familiar with the specifications of the MACE.

Mr. FLOOD. I am not interested in that.

General WOOD. It is an improved MATADOR.

Mr. FLOOD. So far as you know, the answer is "No"?

General WOOD. That is right. I would like to ask General Dick, who heads the special weapons directorate, which includes our missiles, if he has had any conversation on that.

General DICK. I cannot give you a categorical answer, Mr. Flood. We experienced no difficulties in learning of the Air Force development efforts, either from the contractors or from the air development agencies. We have our liaison officers at any firing and at all missile ranges where weapons of other services are tested. I think we are pretty familiar with what they are doing.

Mr. FLOOD. So that so far as the Army is concerned, it is not a hidden weapon. You know its qualities, components, and if the Defense Department ever gets any sense down there concerning these problems and this were assigned to you, it would not be a totally unheard of pigeon, would it?

General DICK. That is correct.

MIDDLE RANGE BALLISTIC MISSILE

Mr. FLOOD. I have this problem about the Army, and that includes R. & D. as well as everybody else. The Army does not fight for itself

any more. You quit that in the last several years. Every now and then some general will, which is a bad thing because he gets his brains knocked out and he retires by Christmas. The precedent is not good and I do not recommend it if you want to be around town long.

However, the Army attitude is not healthy, not normal. It is not the old Army. You are not pulling your weight in these fights. You are getting pushed around.

I have this impression: Year after year now, for the last 5 or 6 years, everybody around here is crazy about space and missiles. This is a highflying outfit. They even got you out into that.

I made a count here last week, and I do not have it now, of the number of minutes in 4 days we spent with Army people. All they talked about was NIKE-ZEUS.

The minute somebody asks you a question about NIKE-ZEUS, everybody in the room starts talking about NIKE-ZEUS; 4 o'clock comes and that is the end of the Army, NIKE-ZEUS—you have been trapped. That is not my idea of what this is all about.

Up until these last couple of hours today we have had nothing worthy of mention outside of aerospace warfare.

We have about $30 billion in this country concerning BMEWS, SAGE, DEWLINE, and all these bombers that the Russians are to send over, and we got trapped into that. Remember we found out we were wrong about 50 percent on those.

All our eggs are in the basket on the ICBM, IRBM, and POLARIS. That is the big talk. Those words are tossed around here every day.

However, I have not heard mentioned twice in 1 year the initials, at least around our hearings, the MRBM. MRBM is a collection of four letters you have not heard here, middle range ballistic missile. Nobody talks about those things.

You hear a passing reference to HONEST JOHN, CORPORAL, and SERGEANT, and it is debatable how much they know about those, because everything is in aerospace ballistic missiles. There is no talk about defense except what we have heard in passing in the way of R. & D. and the 108 fighter.

I am interested in this area of tactical nuclear warfare, tactical nuclear weapons.

I want to know what happened in the Army. Are you interested in R. & D. in tactical nuclear weapons for the Army, ground to ground, up to 500 miles?

If you are not, why are you not? Did you let them talk you out of it? What are you doing about this?

General Wood. We are certainly interested, Mr. Flood, and if for no other reason we are interested because we know of Soviet capabilities in the area.

(Discussion off the record.)

Mr. Flood. Has that directive been changed, not in writing but by gentleman's agreement in the last year?

General Wood. The basic restriction of 200 yards has not been changed.

Mr. Flood. You mean 200 miles?

General Wood. That is right.

Mr. Flood. It has not been changed in writing?

General Wood. That is right, but the directive on the PERSHING specifically did change it so far as that missile was concerned.

Mr. Flood. To what?

General Wood. Off the record.

Mr. Flood. On that one bird?

General Wood. That is right.

Mr. Flood. There is not even a gentleman's agreement to pretend you do not see the Key West Agreement on taking anything to 500 miles yet?

General Wood. That is essentially correct.

The Army is interested, and the Army currently is looking at this problem with a view of raising it.

A principal reason we have not raised it, really, is not our lack of interest, but the inability within the overall funds available, to give it the priority required even if we had authority to do it.

Mr. Flood. That is right.

Mr. Laird. I think it is only fair to state that you have not asked Defense to change it.

General Wood. I think I said that, Mr. Laird.

Mr. Laird. I do not think you implied that.

Mr. Flood. I do not know about what you have done personally. That is my objection.

I am criticizing you or anybody else in the Army that has not 24-hours a day been insisting and demanding and kicking in doors for your right to extend this jurisdiction to 500 miles.

If you do not do it and if you have not done it in my opinion, for what it is worth, that is wrong, because I think if you had done it and got in there punching and made enough noise about it I think you could have gotten it, and I think you still can get it.

Now, go and get it.

I have information. I know what I am talking about.

I have this problem: You and I know that the Russians are operational, and I mean operational, and I mean up to 85 and 90 percent effective up to 750 miles with their MRBM's, and they can drop one in your vest pocket any place in Europe today, and any time during the last 2 years up to 500 miles with this kind of a medium-range ballistic missile with a thermonuclear warhead.

Nobody disputes that intelligently, do they?

Do you?

General Wood. I would say the gist of what you say certainly is agreed to.

Mr. Flood. I will settle for that, then whatever that means.

All right. Now, I have thousands of troops in Europe, American troops of all kinds. I have thousands of dependents, and the NATO Forces are there.

The NATO Forces of all types, kinds, and descriptions are absolutely defenseless against that thermonuclear operational Russian weapon today, is that not true, defenseless?

General Wood. I would say "Yes" and "No," sir. Defenseless insofar as a capability in their own hands to retaliate is concerned.

Mr. Flood. Retaliation they do not have.

General Wood. But not defenseless so far as the agreements with the United States has entered into, NATO and others, to come to their aid with other means at our disposal.

Mr. Flood. I am not talking about strategic bombardment. I specifically told you I am not talking about bombers and I am not talking about IRBM or ICBM, which is not operational with our NATO Forces yet. I am talking about today, and I talk about what I am talking about.

The answer is that our troops are defenseless against Russian medium-range ballistic missiles in the field today. Is that true?

General Wood. Off the record.

(Discussion off the record.)

Mr. Flood. I know that. And from that it follows they are defenseless against the weapon.

General Wood. I cannot associate myself with that view.

Mr. Flood. You cannot?

General Wood. No, sir.

Mr. Flood. I will tell you what you do: Detail for me the defense.

General Wood. It is unlikely that the enemy would use such a missile as long as a U.S. retaliatory capability is available.

Mr. Flood. Is that the defense?

General Wood. Yes.

Mr. Flood. You are in the wrong uniform. You should have a blue one on.

General Wood. No.

Mr. Flood. Let me tell you why. The Air Force concept does not include defense. The Air Force philosophy does not include defense. It is massive retaliation.

General Wood. That is right.

Mr. Flood. Do you embrace that?

General Wood. It is not a question of whether or not I embrace it.

Mr. Flood. Do you or do you not?

General Wood. It is a question of whether the statement is true that the people are defenseless.

Mr. Flood. But I am asking you whether you agree. You cannot have it both ways.

General Wood. I agree it is necessary for the United States to have a retaliatory capability.

Mr. Flood. All right. They haven't. That is my point.

The Russians have induced us to put all our eggs into $30 billion worth of BMEWS, SAGE, DEW line, and everything else, and that is not finished. We don't know how far we will go.

They have induced us to put billions into IRBM and ICBM.

They have induced us to put all our resources and interest and everything into defense against Russian missiles which I say the Russians will not fire, and I am not sure they have everything they are supposed to have.

Therefore, if the Russians have us trapped into that philosophy, and we are straining to be sure we do what they want us to do, and we are doing it, then we have nothing and not enough money to fight the kind of war which the Russians are going to fight with us.

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That is the picture. The minute the shooting starts, and it will start at four or five places at once, it will not be bombers, not IRBM, and not ICBM but medium and tactical nuclear weapons.

You are not pushing this. Why not? Is it an order? You are bound by the memorandum?

General Wood. The memorandum is still in existence but I would say it certainly is not a reason why the Army should not make a proposal if it wanted to.

As I said, such a proposal is under study at the moment. It has not been made.

If there is any basic reason why we have not interested ourselves to a greater extent in the area we are talking about, it is because we have plenty to do in other areas.

Mr. Flood. I know you have. You always have plenty to do.

Mr. Sheppard. The time of the gentleman has expired.

Mr. Flood. Somebody has played shut-out poker with you. They have talked you out of your area.

Mr. Sheppard. Mr. Boyle?

CIVIL DEFENSE

Mr. Boyle. General, some of my inquiries are prompted no little by the fact I got over 1,300 letters in the last few days talking about economy and inflation. My questions will be further suggested somewhat by the fact that when I asked a certain general about civil defense as it referred to Chicago and its environs, he indicated to me that the National Guard probably would be able to give us a little help with some MP service, and they also would be able to furnish us with a band.

From that observation I indicated about 6 million Chicagoans could really be happy that at least we would have a band——

Mr. Flood. To play the death march.

Mr. Boyle. Yes; on that sad occasion. I want to know about civil defense as it refers to your shop. What can you tell us about civil defense?

General Wood. I don't believe I can really tell you very much, Mr. Boyle. It is not an R. & D.——

Mr. Boyle. Do you want to submit something for the record?

General Wood. It is not an R. & D. problem per se.

It is, as you know, an area in which the Army must maintain a continued interest, but not one to which it can devote in peacetime tremendous resources.

Of course, Chicago, while not getting more than General Arnold's band and his MP's for civil defense, is getting a considerable collection of NIKE-AJAX and HERCULES missiles which might help in the overall problem.

Mr. Boyle. That leads up to the question of what is the general responsibility of the Army in this total Air Defense, talking civil defense-wise and the role that the National Guard will play in this?

General Wood. On civil defense I will have to get you a statement from somewhere else in the Pentagon.

On the question of National Guard participation in Air Defense I think Colonel Spengler from the Operations Division can tell you what the plan is.

Mr. BOYLE. Wll you furnish that for the record?

General WOOD. Yes, sir.

(The information requested is classified and has been provided to the committee separately.)

Mr. BOYLE. Who will advise us concerning the relationship of the Air Force with your shop?

General WOOD. With overall R. and D. or with Air Defense?

Mr. BOYLE. Yes, R. and D. as it refers to civil defense.

General WOOD. I am a little bit at a loss on that, sir.

Mr. SHEPPARD. Either you are in a position to discuss civil defense in accordance with his question or you are not. That is all there is to it. If he should direct that question to other sources that is perfectly all right. So far as I know, his questions are proper but I think his questions are misdirected so far as you are concerned.

Do you know about this question? Can you answer his question?

General WOOD. I want to try and be helpful to clarify the question.

Mr. SHEPPARD. Is it in your shop?

Mr. BOYLE. If I am addressing this question to the wrong individual or if it is premature I am glad to be told that and I'll change my conduct accordingly.

General WOOD. I want to try to be helpful and clarify the question, but specifically R. & D. has no program directed to civil defense per se.

AIR DEFENSE

Mr. BOYLE. Then what part of your appropriation, if any, goes to air defense?

General WOOD. We can spell that out for you.

Mr. BOYLE. Supply that, please.

General WOOD. Yes, sir.

(The information requested follows:)

In fiscal year 1960, $325.1 million of the R.D.T. & E. appropriation is devoted to air defense. This figure, which includes NIKE-ZEUS, constitutes 33 percent of the Army portion of the fiscal year 1960 R.D.T. & E. appropriation.

HISTORY OF NIKE DEVELOPMENT

Mr. BOYLE. Long before I got into the Congress and long before I became associated with this committee there was considerable talk about the NIKE development and the NIKE start. Can you furnish for the record when that started?

General WOOD. We can furnish for the record a history of the NIKE development.

(The information requested follows:)

HISTORY OF NIKE DEVELOPMENT

THE NIKE SYSTEM

The Army's NIKE surface-to-air missile project was begun in 1945, and has continued to be a service-industry team effort of Army Ordnance Corps, Western Electric Co., Bell Telephone Laboratories, Douglas Aircraft Co., and hundreds of subcontractors.

From the beginning of the project, some very specific objectives were established. The NIKE system would have these characteristics:

A supersonic rocket that is free of dependence on atmospheric oxygen.

A guided weapon able to receive orders after launch so as to insure accuracy even against targets that take evasive action.

A ground-based guidance system.

A warhead of sufficient lethality to assure destruction of its target.

An "open-ended system", that is, one that can be economically improved with the least obsolescence of existing components.

NIKE-AJAX

AJAX, the first member of the NIKE family has been operational since the first battery was installed in 1953 at Fort George G. Meade, Md. Today, NIKE-AJAX stands guard in and around many of our major cities, industrial complexes, and strategic centers. Though it is being replaced by the longer range HERCULES system, AJAX is still an effective air defense weapon.

NIKE-HERCULES

Even before AJAX became operational, the Army in 1952 was working toward a more effective missile to meet future requirements for greater range and altitude and increased lethality. This second generation of the NIKE family is called HERCULES. It has been operational since June 1958 in the New York, Washington-Baltimore, and Chicago defenses and has now been extended to many other areas to supplement the AJAX. Eventually there will be HERCULES batteries at all local defense areas.

All new NIKE sites under construction or planned are designed to accommodate HERCULES. As already mentioned, the NIKE system is designed for progressive improvement, so that old AJAX sites can be economically converted for HERCULES, and both missiles can, if necessary, be fired from the same launching areas.

HISTORY OF NIKE-ZEUS DEVELOPMENT

In March 1955, Western Electric Co. undertook a study for the Army to determine the feasibility of the defense of CONUS against all forms of the air threat for the 1960–70 decade, to include ballistic missiles. In the fall of 1956, the results of this study indicated that a defense was feasible and proposed the NIKE-ZEUS system development. NIKE-ZEUS system development was initiated in November 1956. The development program has continued and has now reached the stage where the system could be put into production.

Mr. BOYLE. Will you also include all of the costs in connection with this project?

General WOOD. Yes, sir.

(The information requested is classified and has been furnished the committee.)

COORDINATION OF AIR DEFENSE

Mr. BOYLE. I have in mind all the projects including those lake installations around Chicago, and make your statement more inclusive than Chicago.

General WOOD. You want it nationwide?

Mr. BOYLE. Yes.

I want to know, too, where the Navy and Air Force come into this NIKE picture, if they do. If they do not indicate why they do not so there will be some intelligent answer on merely the reading of this year's hearings.

General WOOD. Very well, sir.

(The information requested follows:)

The North American Air Defense Command (NORAD) exercises operational control over all air defense forces available for defense of North America. Within this operational command are Army, Air Force, and Navy elements. The Army element, the U.S. Army Air Defense Command, mans the Army NIKE weapon systems deployed around vital installations, industrial complexes, and population centers. The Navy element provides picket ships, airborne

radar and intercepter aircraft. The Air Force element provides airborne early warning and control aircraft, ground based early warning and control stations and intecepter aircraft.

Mr. BOYLE. I am very interested in this whole picture to see if the NIKE development has been coordinated with the Navy, Air Force, and civil defense and National Guard.

If it has not been so unified tell us the reasons why it has not.

General WOOD. Yes, sir.

(The information requested follows:)

1. The NIKE program has been pursued by the Army under the direction of the Joint Chiefs of Staff and the Department of Defense. The three services are kept informed on air defense developments through the media of periodic exchange of R. & D. progress reports and liaison officers at various installations. In the case of developments which are of specific interest to the Air Force or the Navy as users, intensified and refined coordination is effected during all stages of the development cycle.

2. The Army does not coordinate directly with civil defense agencies on the development of Army air defense missile systems. The Army does support civil defense activities insofar as they do not interfere with military operations.

3. The U.S. Army National Guard has been in close contact with the NIKE program. Selected personnel have undergone training at the Air Defense School and units of the Army National Guard are now operating a number of Army NIKE sites as an integral part of the air defense bases of continental United States.

Mr. BOYLE. Then along comes the NIKE-AJAX.

General WOOD. AJAX was the first missile deployed in 1953. HERCULES began deployment last summer.

Mr. BOYLE. Can you detail the number of these NIKE AJAX installed?

Colonel SPENGLER. We had nearly 250 AJAX batteries in the United States.

Mr. BOYLE. Can you tell us where they have been deployed?

Colonel SPENGLER. Yes, sir.

(The information requested is classified and has been provided the committee separately.)

NIKE-HERCULES PROGRAM

Mr. BOYLE. You told me the second generation was the NIKE-HERCULES. Is that right?

General WOOD. That is right.

Mr. BOYLE. Will you be able to tell us how much the HERCULES program has cost?

General WOOD. Yes, sir.

(The information requested was provided in response to the question on p. 402.)

Mr. BOYLE. How many operational units and missiles have been bought? Do you have them now?

General WOOD. Yes, sir. We began deployment last summer and we have continued it as we trained units every quarter at the Air Defense School.

Mr. BOYLE. Will you indicate the number of operational units you bought and the number you have? You can do it for the classified record of you wish.

(The information requested is classified and is provided the committee separately.)

Mr. BOYLE. The question that follows is where are they deployed now? There should be something in the record to indicate whether these sites and installations are complemented with the Navy, the Air Force, civil defense, and the National Guard.

General WOOD. You are merely interested in U.S. deployment and not overseas deployment?

Mr. BOYLE. Yes.

General WOOD. You are interested in the 49th State, sir?

Mr. BOYLE. Yes.

(The information requested is classified and is being provided the committee separately.)

NIKE-ZEUS

Mr. BOYLE. Did I understand your testimony to be that NIKE-ZEUS will be testworthy in ——— ?

General WOOD. What we plan is what we call a system demonstration at White Sands Missile Range in New Mexico in ———.

Mr. BOYLE. What is your best judgment as to when it will be testworthy? It is simple enough to put the show on, for instance, at a given date, but it may be that you are only firing the second section or the first section.

When do you think the complete prototype will be ready?

General WOOD. This is the problem: At White Sands Missile Range we will be able to fire a missile only within the atmosphere and at either aircraft targets or simulated targets. We do not have the room there to fire it actually against an incoming missile.

At the same time we will be constructing an installation for testing and training at Kwajalein Island in the Pacific.

Mr. BOYLE. You do not have to evaluate any testimony presented to this committee, but there is a lot of solid testimony that you are a lot longer away from home than you think, and the reason you are is because of the ———. Tell me about the chief "bugs" in the NIKE-ZEUS system today.

General WOOD. I do not know what criticism has been raised here.

(Discussion off the record.)

Mr. FLOOD. Admiral Hayward, sitting in that chair where the general is sitting now, said yesterday that as far as he was concerned he had no confidence or faith in NIKE-ZEUS, under no circumstances should you even be thinking about procurement of hardware, because you are utterly and totally lacking so far as R. & D. is concerned, although he hastened to add that he hoped you continued R. & D. for all it was worth.

However, as far as the operation of this thing is concerned, or procurement of any kind is concerned, until you are much, much, much better off than you are today in your ——— , keep it in your shop and more power to you.

Mr. SHEPPARD. The time of the gentleman has expird.

Mr. BOYLE. I have a number of questions that I have been unable to get to by reason of the limitation of time, and since General Wood is taking the place of General Trudeau I will ask leave at this time to have these questions answered in the record.

Mr. SHEPPARD. There is no objection, so ordered.

ADDITIONAL QUESTIONS INSERTED IN THE RECORD BY MR. BOYLE

1. Question: How is the Army responsibility for air defense related to the Air Force responsibility for overall continental air defense? What is the basis for these responsibilities?

Neither the Army nor the Air Force is responsible for the overall continental air defense. The Commander-in-Chief, North American Air Defense Command has that responsibility. The United States part of his command is composed of Army, Navy, and Air Force elements.

The relationship of the Army and Air Force responsibilities for continental air defense is based upon the Department of Defense Directive No. 5100.1, "Functions of the Department of Defense and Its Major Components," dated December 31, 1958. In that document, the Army's primary functions include organizing, training, and equipping of Army air defense units, including the provisions of Army forces as required for the defense of the United States against air attack. In like manner, the DOD directive includes among the Air Force functions that of organizing, training, and equipping of Air Force forces to defend the United States against air attack. The Air Force also has the function to develop, in coordination with the other services and for approval of the Joint Chiefs of Staff the doctrines and procedures for the unified defense of the United States against air attack.

2. Question: What is the total NIKE-AJAX cost? How many operational units and missiles did we get for our money?

The total cost of NIKE-AJAX was provided on page 402. The balance of the information is classified and is provided the committee separately.

3. Question: What additional NIKE-HERCULES deployment is planned for the future?

The information is classified and is provided the committee separately.

4. Question: Can NIKE-HERCULES operate without SAGE; if so, how efficiently?

NIKE-HERCULES can operate without SAGE. Additional information is classified and is being provided the committee separately.

5. Question: Has the NIKE-HERCULES been tested in missile environment? What were the results? What are the operational capabilities of NIKE-HERCULES, speed, altitude, range?

The information is classified and is provided the committee separately.

6. Question: Will it be able to intercept 2,000 miles per hour above 80,000 feet? If so, how far might this intercept take place?

The information is classified and is provided the committee separately.

7. Question: Will the NIKE-HERCULES have any capacity against air to surface missiles similar to HOUNDDOG?

The information is classified and is provided the committee separately.

8. Question: Does the NIKE-HERCULES have any antiballistic missile capability?

NIKE-HERCULES was not designed to have an antiballistic missile capability. NIKE-ZEUS is being developed to combat the ballistic missile threat.

9. Question: What is the Army ballistic missile defense responsibility? What are Army, and Air Force, National Guard, civil defense in same area?

The answer is classified and is being provided the committee separately.

10. Question: When did NIKE-ZEUS start? Is this an extension of NIKE-HERCULES? How much money will have been allocated to this project by the end of fiscal 1959? What do we have in hand for these expenditures?

The information is classified and was supplied in response to Mr. Sheppard's question on page 384.

11. Question: Have any full scale components of the NIKE-ZEUS been built and tested?

The information is classified and was supplied in response to Mr. Sheppard's question on page 384.

12. Question: Has a prototype system of any kind been built?

The information is classified and was supplied in response to Mr. Sheppard's question on page 384.

13. Question: When did I understand you to say the NIKE-ZEUS will be test worthy?

The information is classified and is being provided the committee separately.

14. Question: When will the NIKE-ZEUS system actually be tested against a ballistic missile? Where?

The information is classified and was supplied in response to Mr. Sheppard's question on page 384.

15. Question: What is the planned composition of a NIKE-ZEUS battery? How many incoming ICBM's should it be able to handle at the same time?

The answer is classified and was supplied in response to Mr. Sheppard's question on page 384.

16. Question: In the total defense of the North American Continent under the NORAD, would the NIKE-ZEUS be deployed in Canada? Would these be Canadian or U.S. units?

The answer is classified and is being provided the committee separately.

17. Question: Navy and Air Force representatives spoke of the possibility of detecting enemy ballistics shortly after launch, using means other than radar, and then attacking these missiles at or before apogee. What is the Army's thinking? Do you consider that the NIKE-ZEUS system can provide better ballistic missile defense?

The answer is classified and is being provided the committee separately.

18. Question: Does the NIKE-ZEUS have any growth potential to attack IRBM's farther away than is presently contemplated? Same question as to ICBM's.

The answer is classified and was supplied in response to Mr. Sheppard's question on page 385.

19. Question: What modifications or new developments would be involved?

The information is classified and was supplied in response to Mr. Sheppard's question on page 385.

RIFLE DEVELOPMENT

Mr. LAIRD. I would like to know the total amount of funds that have been used during the last 10-year period from R. & D. in the development of the new rifle.

It seems to me if we go back over these hearings in R. & D. each year this committee has made available all the funds that have been requested for this particular research and development work.

I have not added them up but it seems as though we set aside a considerable sum of money.

General WOOD. Could we supply that answer, sir?

Mr. LAIRD. I would like it supplied.

(The information requested follows:)

The funds used in rifle and small arms ammunition developments for the period 1949–59 are $7,300,000 for the rifle and $6,155,000 for ammunition.

TANK DEVELOPMENT

Mr. LAIRD. We have heard a lot of talk about the development of tanks in the United States, and this committee over the last 10-year period has made available on every occasion the amounts of funds that have been requested by the Army for this research and development work.

As of now we still have many questions in our minds concerning how far along we are on tank development.

I would like to know how much money we have expended in R. & D. in this particular area.

General WOOD. Referring to tanks?

Mr. LAIRD. Yes.

General WOOD. Over a 10-year period?

Mr. LAIRD. Yes.

General WOOD. We will supply that.

(The information requested follows:)

COSTS OF TANK DEVELOPMENT

The total expenditures for tank development for the past 10 years (fiscal year 1950 through fiscal year 1959) has been $43,106,000.

COORDINATION OF R. & D. EFFORT

Mr. LAIRD. I have considerable doubt in my mind as to whether we are getting our money's worth from the research and development funds that are being made available to each of the three services. We have had to go over this particular item in the budget every year. We have gone along with the budget request. We have not changed the requests very much.

We still seem to have many unanswered questions. What kind of coordination is there among the three services in the matter of R. & D. and the use of R. & D. funds?

General WOOD. First let me say so far as the operation of the programs is concerned, there is considerable contact between the services at the technical level and the contractor level. There is good exchange of information and knowledge of what is going on. So far as the formulation of programs is concerned in areas in which there are mutual interests such as, for example, the development of a helicopter, which may be of interest to the Marines, the Navy, the Army, and the Air Force, coordination is effected direct and by coordinating committees which work out of Dr. York's office, and subsequently by his staff. As a matter of fact, his staff, which is being reorganized and enlarged, will probably become more active in that work.

Mr. LAIRD. Do you not think it important that his office take a more active part?

General WOOD. Yes and no. I think it desirable that his office take an active part so far as policy is concerned. I think it a mistake to centralize the operations of the research and development effort unless one wants to make an impossible bottleneck which in turn will lengthen leadtime between concept and material.

Mr. LAIRD. Have you made a presentation of the R. & D. work of the Department of the Army to the Joint Chiefs of Staff at any time during the last 2- or 3-year period?

General WOOD. To the Joint Chiefs of Staff themselves, so far as I know, no, sir. Parts of the——

NIKE-HERCULES VERSUS BOMARC

Mr. LAIRD. I was rather surprised to learn of the grave differences that exist in R. & D. between the three services. We get into a position here where we have you people in R. & D. for the Army raising serious questions about the capability of BOMARC-A as compared with NIKE-HERCULES. For the first time yesterday I heard that NIKE-HERCULES had done everything and more than BOMARC-A. That is not the same as the testimony we got from the Air Force.

General WOOD. I did not hear the Air Force testimony, so I do not know the point that you mean.

Mr. LAIRD. How many miles have you gone with an intercept in your research and development as far as the NIKE-HERCULES?

General WOOD. So far as range is concerned?

Mr. LAIRD. Range.

General WOOD. The maximum range of the system is on the order of———.

Mr. LAIRD. How far have you gone in intercept?

General WOOD. I do not have the records with me, but we have certainly had intercepts, maybe not exactly———but on the order of———.

Mr. LAIRD. With BOMARC-A——

General WOOD. That is about as much as the range will afford at White Sands.

Mr. LAIRD. Is that because of the limit of the range?

General WOOD. The limit of the system is approximately———as you know.

Mr. LAIRD. But that is not the limit of the BOMARC-A.

General WOOD. The BOMARC missile itself has a greater range. The missile itself certainly has a range on the order of 180, maybe 200 miles.

Mr. LAIRD. That is why I tried to get the statement which was made yesterday clear in my own mind. Yesterday it was testified by your shop that you had done everything with the NIKE-HERCULES that could possibly be done with the BOMARC–A missile series.

General WOOD. I think General Trudeau was indicating that we had knocked down targets. As a matter of fact, the HERCULES has knocked down targets that no other surface-to-air missile has knocked down. As I started to say, the BOMARC missile itself is a ramjet missile with considerable range, but the question of controlling it to intercept is based on an integrated communication and radar system known as SAGE, which is part of its competence.

CONSIDERATION OF RESEARCH PROGRAMS BY THE JOINT CHIEFS OF STAFF

Mr. LAIRD. I understand that, General, but the problem I have as a member of this committee is that it seems to me we are not in a position where problems like this should be taken to us, but this should be decided someplace in the Department of Defense. I am surprised to learn that the Joint Chiefs of Staff have never had a presentation of the R. & D. work which is going on by the Army, and I assume the same applies to the Air Force and the Navy.

General WOOD. The Joint Chiefs of Staff have not had a presentation on the whole R. & D. program by me or by the Army R. & D. but the Joint Chiefs of Staff, I am certain, have considered missile systems, shall we say, and other aspects of R. & D. and operational work. I do not disagree with your statement that perhaps the Department of Defense should have a position on that. I am not certain I am the fellow you should tell that to.

Mr. LAIRD. I am unable to find one missile system that the Joint Chiefs of Staff have considered. I have yet to put my finger on a single military missile system proposed by the Navy, the Air Force or the Army that the military chiefs of this country have ever considered.

I think there is some serious weakness here, and I think it is incumbent upon our military leaders to give some consideration to what is going on in R. & D.

General Wood. I am not in a position to be an expert witness on JCS matters, but I am certain General Taylor told you that the recommendation for missile defense of the continental United States was submitted to the Joint Chiefs of Staff by General Partridge, the commander of the Continental Air Defense Command. Further, that those recommendations were reviewed by the Joint Chiefs of Staff, and recommendations from them were passed on to the Secretary of Defense.

Mr. Weaver. Where do the budget people come in on these presentations? How can they adequately know that the overall budget is made up correctly if they have not had any such presentation?

General Wood. I recall General Taylor told you that he felt there was a defect in the system because there were no standards, no criteria of sufficiency for whatever the job was to be done, which could then be priced and lined up against other tasks which had to be done. In the current method of operation, so far as I understand it, the budget people in the Office of Secretary of Defense are advisers to the Secretary of Defense as to what items should be included in the budget or not included.

Mr. Laird. My point, General, is that these unanswered questions in the research and development field are brought up here to this committee. It seems to me there should be some military determination by the professional military leaders of this country before they are laid out on this table, and you can see that there is great controversy existing between all three branches. I do not think it is good for the military and it is not good for our country.

That is all the questions I have.

Mr. Flood. If the gentleman will permit me, the most revealing statement I have heard this year was the one made by the general in reply to my friend there when he said he is sure that in the Department of Defense there are people from the Bureau of the Budget who tell the Secretary of Defense what items are to be included and what items are not to be included in the Defense budget. That's wonderful. That's great and it's what I am afraid of.

General Wood. That was taken out of context, Mr. Flood. I meant to say the Defense budget people as a part of the staff are advisers to the Secretary.

Mr. Sheppard. This has been going on since 1921.

Mr. Flood. Does that make it right?

Mr. Sheppard. Not necessarily.

Mr. Laird. I conferred with the people from the Bureau of the Budget to try to find an answer to this particular question, and after conferring with their people I do not believe that that is the case as far as the Department of Defense is concerned. They have just as hard a time finding answers to many of these questions as our committee has.

Mr. Flood. I think most of that is true, but I also think the budget is put together by all the departments, and they come up with figure "A", and then it is decided what the ceiling of the budget is to be, figure "C". Subtract one from the other and the Bureau of the Budget says to the Defense Department, "Figure 'B' is the Defense

budget. Don't go beyond it for any reason." That is where the trouble is.

Mr. SHEPPARD. Mr. Ford.

R.D.T. & E. BUDGET FORMAT

Mr. FORD. General Wood, I am correct that chart 1 in your presentation shows the Army R.D.T. & E. budget for fiscal 1958, 1959, and 1960 under the format in the budget presentation for fiscal 1960?

General WOOD. Yes, sir.

Mr. FORD. This includes the various comparative transfers from the various accounts?

General WOOD. Yes, sir. Of course, we put the figures from 1958 and 1959 in that format in order that they would be comparable with 1960.

Mr. FORD. That is very helpful. Chart 2 is a combination of the format of the R.D.T. & E. budget for fiscal 1958, fiscal 1959, and fiscal 1960 using the old format and the new format. Is that correct?

General WOOD. No, sir. Chart 2 is the same. You see, the figures not in parenthesis are the same as the figures on chart 1, except chart 1 is rounded off to even million dollars. What we have done on chart 2 is to show the breakdown of those figures as they were in the past according to R. & D., Procurement of Equipment and Missiles, and O. & M. appropriations.

Mr. FORD. In other words, we have no chart for comparative purposes using the old format for R. & D.

General WOOD. You can get it from this paper. If you take the total R. & D. figures under 1958, for example, of $450 million in parenthesis, where it says subtotal Army, $747 million, of which R. & D. is $450 million, that would be the R. & D. total in the Army budget for 1958.

Mr. FORD. That subtotal down there, R. & D.——

General WOOD. R. & D., yes, sir.

Mr. FORD. For the 3 fiscal years, are the figures for comparative purposes under the old format?

General WOOD. That is correct: 1958 and 1959 are the actual figures in those budgets, and 1960 shows the comparative amount in R. & D. if the format had not been changed.

Mr. FORD. Mr. Chairman, I presume that these two charts will be a part of the record.

Mr. SHEPPARD. They will be.

Mr. FORD. They are a part of General Wood's statement. However, I would suggest, just for the benefit of the committee and others who might by chance read the record, that you extract from chart 2 those figures we have discussed, R. & D., for the 3 fiscal years, and put them in a very simple chart, not a part of this statement, for the record at this point.

General WOOD. Just R. & D. figures?

Mr. FORD. That is correct.

Mr. SHEPPARD. You will supply that information for the record, please.

(The information requested follows:)

Army R. & D. funds, fiscal year 1958, fiscal year 1959, and fiscal year 1960
(Direct obligations—millions of dollars)

	Fiscal year 1958	Fiscal year 1959	Fiscal year 1960
Military sciences	92.4	96.5	88.0
Aircraft and related equipment	12.1	16.2	17.3
Missiles and related equipment	183.2	200.1	213.7
Ships, small craft, and related equipment	0.3	0.2	0.2
Ordnance, combat vehicles, and related equipment	60.7	56.6	71.2
Other equipment	51.6	74.2	74.4
Programs wide management and support	49.7	56.7	53.2
Subtotal, Army	450.0	500.5	518.0
DOD agencies	42.4	53.9	55.0
Grand total	492.4	554.4	573.0

*Fiscal year 1960 column represents only Army R. & D. funds which were included in the new R. D. T. & E. appropriation.

FISCAL YEAR 1959 BUDGET REQUEST

Mr. FORD. What was the Army R. & D. budget request for fiscal 1959, the basic request which was submitted to this committee last year?

General WOOD. With which we came to the committee? May I ask Mr. Woodside, who is my budget man and is familiar with that, to give me the figure.

Mr. WOODSIDE. The appropriation request for last year, sir, was $498,700,000.

Mr. FORD. That was the figure submitted to us in the basic budget for fiscal 1959?

Mr. WOODSIDE. That is correct, sir.

Mr. FORD. As I recall, the Congress made available all that was requested, is that correct?

Mr. WOODSIDE. That is correct.

Mr. FORD. How much has been made available to the Department of the Army out of that total of $498.7 million?

Mr. WOODSIDE. Sir. I believe the entire amount has been apportioned. I would like to point out, of that $498 million, part belongs to the DOD agencies carried in our budget, it is not Army money as such.

Mr. FORD. NSA and one or two others.

Mr. WOODSIDE. Yes, sir, NSA and AFSWP.

General WOOD. Only those two, NSA and AFSWP. The total last year was $28 million.

Mr. FORD. All of the $498.7 million has been apportioned by the Bureau of the Budget?

Mr. WOODSIDE. That is correct.

OBLIGATIONS

Mr. FORD. How much has been obligated as of your last reporting?

Mr. WOODSIDE. Obligations as of the end of February, sir, were $373.8 million.

Mr. FORD. About three-quarters of your total has been obligated as of February 28, 1959.

Mr. WOODSIDE. Yes, sir.

Mr. FORD. What do you expect to have unobligated at the end of the fiscal year?

Mr. WOODSIDE. At the end of 1959, sir, we expect an unobligated balance of $25.3 million.

Mr. FORD. Is that higher or lower than what you had in previous fiscal years?

Mr. WOODSIDE. Sir, it is considerably lower than the amount we had at the end of 1958. It is roughly the amount we normally expect to have at the end of a fiscal year; 1958 was a little unusual in that substantial amounts of money were made available from the emergency fund late in the year, which prevented us from obligating it prior to the close of the fiscal year. In the amount unobligated at the end of 1958, there was a substantial amount of money for the Armed Forces special weapons project.

Mr. FORD. Because of the curtailment in atomic testing?

Mr. WOODSIDE. Sir, it is due to the nature of their testing.

General WOOD. They are ahead on funds for possible use later.

Mr. FORD. All of this $25.3 million, I presume, is programed, if not obligated.

Mr. WOODSIDE. Yes, sir. We do not plan an unobligated balance as such. We know it will occur, but we do plan to obligate all of our money, but for administrative reasons it just does not happen.

Mr. FORD. It has been indicated that $498.7 million was requested and made available. As I read the figure in the chart for fiscal 1959, it hows $500.5 million for R. & D. in fiscal 1959. How do you explain the difference?

General WOOD. As a matter of fact, that is not necessarily final, because we are not at the end of the fiscal year, but Mr. Woodside can explain the difference, which has to do in general with emergency funds being made available.

Mr. FORD. That was the next question I was going to ask.

Mr. WOODSIDE. In 1959, we had transferred into our appropriation, in addition to the $498 million, emergency funds from the Department of Defense of about $13.2 million, we had an additional amount of $15.5 million from the ARPA appropriation, and we transferred out about $4.1 million to the National Aeronautics and Space Administration. So we have a net adjusted appropriation of $523.3 million.

Included in there are the funds for the two DOD agencies. The $500 million that you see in chart 2 represents the Army only.

USE OF EMERGENCY FUNDS

Mr. FORD. You just testified that emergency funds to the extent of $13.2 million have been made available to Army R. & D. in fiscal 1959. For what projects were those emergency funds transferred, and in what amounts?

Mr. WOODSIDE. This $13.2 million figure that I just read was at the time the budget was prepared. There have been certain actions since that time. I can tell you, sir, during 1959 what has been transferred and what has been approved by the Bureau of the Budget through April 6, 1959.

Mr. FORD. What I would like is a listing of the requests for emergency transfers and the amounts and, in addition, the amounts that were actually transferred and the dates of those transfers. There may be a variation or there may not be. I do not know.

Mr. WOODSIDE. I do not have a list of the requests available, sir. I shall have to supply that for the record. I have a list of the amounts that have been approved.

Mr. FORD. Give me those, and then if there are any significant ones that have not been approved, perhaps you could recall those.

Mr. WOODSIDE. All right, sir. I will give it to you on a chronological basis.

There was $677,000 for the Armed Forces Special Weapons Project, for their testing.

There was $7.5 million for one classified project for the National Security Agency, and $5 million for another classified project of the National Security Agency.

There was $150,000 for a classified evaluation test for the weapons systems evaluation group.

There was $200,000 for the materials advisory board.

There was $267,000 for the operation of the IGY rocket facility at Fort Churchill for upper atmospheric research.

All of these funds represent requirements which are not part of the regular Army R. & D. program.

There was one approval for the Army R. & D. program of $1.6 million for antiradiation agent research.

Mr. FORD. That has been approved?

Mr. WOODSIDE. That was approved on the 6th of April.

Mr. FORD. Does the Army have pending any other requests for emergency fund transfers for R. & D.?

Mr. WOODSIDE. There are some others in process.

Mr. FORD. Do you recall what they are?

Mr. WOODSIDE. I can recall one. I would prefer to supply a complete list for the record, sir. I do not know the status of them, as to whether they are still within the Army, DOD, or BOB.

Mr. FORD. I think it is good to have them for the record. I would like to see them, along with the list of those which have been requested whereon affirmative action has been taken prior to April 6, 1959. If you could submit them for the record as well as let me see a copy, I would appreciate it.

Mr. WOODSIDE. Yes, sir.

(The information requested follows:)

Status of requests for transfer of Department of Defense emergency funds to the Army Research and Development appropriation, fiscal year 1959

Item	Amount requested	Amount approved	Date approved
AFSWP	$677,000	$677,000	Aug. 5, 1958
Classified NSA project	7,500,000	7,500,000	Sept. 25, 1958
Do	5,000,000	5,000,000	Oct. 20, 1958
WSEG test	150,000	150,000	Dec. 16, 1958
Materials advisory board	200,000	200,000	Mar. 2, 1959
Fort Churchill, IGY rocket facility	267,000	267,000	Mar. 19, 1959
Antiradiation agent	2,000,000	1,600,000	Apr. 6, 1959
AFSWP	4,000,000		

REPROGRAMING ACTIONS

Mr. FORD. General Wood, what, if any, general reprograming has taken place in the Army R. & D. program for fiscal 1959 between your presentation last year and the execution during this fiscal year?

General WOOD. I do not believe I am prepared to answer that in detail, Mr. Ford. I shall be glad to submit it. I can think of no tremendously large items fundwise, but a large number of small items.

We decided, for example, instead of five test items, to get only three, which might save $100,000 which we would use for something else.

Mr. FORD. I am more interested in basic changes in your program between your presentation and your execution. I am not particularly concerned about whether you buy five or three test items. I think the committee should know if in a period of 12 months you have gone through any general reprograming. Has your philosophy toward a certain program changed or have you gone in a different direction in certain items?

General WOOD. I can tell you one which you certainly know about, and that is the cancellation of the DART program, the guided antitank missile, which we have had under development on the order of 4 or 5 years. We decided, as a good poker player, we would cut our losses and get out because we were just not producing the product that we wanted and we were not getting more than 50 percent efficiency out of it. So we saved out of that program—I will check this figure for the record—on the order of $3 million. We utilized fiscal year 1959 funds programed for DART first to purchase an interim antitank capability for units overseas by supplying them with the French SS–10, a weapon not as lethal and, in our opinion, not as good as we had hoped DART would be, but a weapon which was proving efficient within its capability.

In addition, we utilized fiscal year 1959 DART funds for testing of other already produced antitank weapons, including the SS–11 from the French, to see if we could find a better one, into further research in American sources for an antitank weapon, and into the reactivation of the 120 millimeter antitank recoilless rifle.

That is the best of my memory, and I shall correct the detail, if I may.

(The following statement was submitted.)

Major reprograming actions during fiscal year 1959 in R. & D. funds

[Millions of dollars]

Project:	*Change*
DART	—$3.0
LACROSSE	—3.0
SERGEANT	—3.0
LITTLE JOHN	—1.7
Chinook helicopter	—1.5
250 horsepower aircraft engine	—1.2
MAULER air defense guided missile	+2.5
Combat vehicle weapons system (Pentomic)	+1.6
HONEST JOHN improvement	+3.7
DAVY CROCKETT	+1.9
Miscellaneous aircraft developments	+2.7
Miscellaneous other developments	+1.0

Additional classified information has been provided the committee.

Mr. FORD. There are no other major reprogramings that you can recall?

General WOOD. I have with me General Dick and General Britton, who are my two principal directors, and I would like to ask if they want to say anything at this time.

General BRITTON. I know of no major changes other than the DART, although there is a tank program which has an element of change here in that we used part of our development work on the T–95 and product improvement work on the M–48, plus the component work on the engines, which all fed into the M–60 tank. So, in a way, this is a change of program, but not a major change, such as I believe you really have in mind.

M–60 TANK GUN

Mr. FLOOD. Will the gentleman yield. Was there any reprograming of the American gun to be used in that tank when you ran into the problems of the British gun? Was there any reprograming when you found what your problem was?

General WOOD. No, sir. What we did was to conduct a comparative test of all possible tank guns and ammunition in order to determine the most readily available gun to put on the XM–60. A little of the history of that, while I am sure it may not change your feeling regarding the British gun, Mr. Flood, as you know, we have——

Mr. FLOOD. I have no feeling against the British gun. My feeling is against you for not having a better one.

General WOOD. I want to explain that a little bit. We have what is called the mutual weapons development program under which we assist certain foreign countries in developing items in which they show some promise and which, for various reasons, we are not at the moment developing. We get rights to produce that, of course, if it is developed and turns out to be something that we can use, and the NATO nations do, too, as a matter of fact.

We had been emphasizing work in other calibers more than the 105. When it came time to have this comparative test in order to determine a gun which we had to have right away, truthfully this one showed up the best—period.

Mr. FLOOD. I am glad to hear all that, but Mr. Ford was examining you specifically on reprograming, and I was wondering whether——

General WOOD. I wanted to take the opportunity to talk a little about the 105.

No, sir, there was no reprograming there. This is a procurement action.

EUROPEAN RESEARCH OFFICE

Mr. FORD. Does the Army R. & D. program have any overseas setup such as the Air Force has in Europe?

General WOOD. We have in Franfurt the European Research Office.

Mr. FORD. How big an operation is that?

General WOOD. A small group of officers and scientists, on the order of 10 men. May I ask Colonel Kimball to be specific on that.

Colonel KIMBALL. That is the right size, on the order of 10; 6 military and 3 or 4 civilian scientists. The program is scattered throughout Western Europe.

Mr. FORD. Does that office contact European scientists and technicians for work, or do they handle the work themselves?

Colonel KIMBALL. It is all contract work, sir.

Mr. FORD. With the scientists of the European countries?

Colonel KIMBALL. That is correct, sir; basic research.

Mr. FORD. About how much, in dollars, does the program represent on an annual basis?

Colonel KIMBALL. On an annual basis, $600,000, sir.

Mr. FORD. Do you pay in dollars, or do you pay in counterpart funds?

Colonel KIMBALL. I believe it is paid in dollars. I will have that verified for the record, sir.

Mr. FORD. I wish you would verify it for the record, but also find out why you cannot pay it in counterpart funds.

Colonel KIMBALL. Right, sir.

Mr. FORD. Have you ever explored that possibility?

Colonel KIMBALL. I do not know, sir.

Mr. FORD. I think it a very legitimate area where the Army could save, in this case, about $600,000. The Air Force program is substantially larger than that, and apparently they had done some exploratory work and had not gotten very far with it.

Mr. SHEPPARD. General Moore, can you answer this question, because it falls under your jurisdiction.

General MOORE. Without being asked, I asked my office to explore the possibility and to go into it thoroughly, and I will furnish that to the committee.

(The information requested follows:)

STATEMENT ON FACTORS INVOLVED IN UTILIZATION OF LOCAL CURRENCY INCLUDING COUNTERPART FUNDS, BY DEPARTMENT OF DEFENSE MILITARY FUNCTIONS OPERATIONS

The U.S. balances of local currencies as of December 31, 1958, were the equivalent of approximately $1.6 billion. Approximately $1.3 billion of these local currencies were in the custody of the U.S. Treasury. These balances were largely generated under Public Law 480, and to a lesser extent were derived from U.S. share of counterpart funds obtained under the mutual security program, surplus property sales, interest payments, etc. Approximately $300 million of the local currencies were held and administered by the International Cooperation Administration and were generated primarily through the sale of commodities under section 402 of the Mutual Security Act.

A. COUNTERPART FUNDS

Counterpart funds are generated from economic aid programs under the mutual security program. When United States provides economic assistance under the mutual security program, the country receiving such assistance usually is required to set aside in a special account an amount of its currency equivalent to the dollar value of the assistance received. The Mutual Security Act requires that a portion of these funds, as determined by the President, be reserved for U.S. uses. Normally 5 to 10 percent of such funds are reserved for paying U.S. obligations abroad and are included in the U.S. Treasury balance. Agencies using such currencies purchase them with appropriated dollars under the provisions of section 1415 of the Supplemental Appropriation Act of 1953. The remainder of the counterpart funds set aside by the recipient countries under these agreements may be used only for purposes mutually agreed between the countries concerned and the United States. The most frequent purpose is to meet local costs of projects under aid programs. The equivalent of approximately $700 million was available for recipient country programs as of December 31, 1958. This amount is not U.S. owned and consequently is not included in U.S. Treasury balances.

B. LOCAL CURRENCY RECEIVED FROM PUBLIC LAW 480 SALES

Public Law 480, the major source of local currencies utilized by the Department of Defense, was enacted to dispose of surplus agricultural commodities and to assist in accomplishing U.S. foreign policy objectives. Section 104 of Public Law 480 authorizes the use of the local currencies received in return for the surplus commodities for a variety of purposes—for U.S. uses such as market development, common defense, educational exchange activities, payment of U.S. obligations, etc., and for the benefit of the countries receiving the commodities, such as loans. The uses of the currency are specified in agreements between the United States and the countries concerned. Early agreements specified exact amounts for each purpose; more recent agreements combine all or a major portion of the currencies reserved for U.S. uses.

Generally speaking, the major portion, or over 60 percent, of the proceeds from such surplus agricultural sales are used for long-term loans for financing economic development (section 104g). As of December 31, 1958, loan agreements had been signed covering over 75 percent of the local currencies set aside for such loans. The agreements with the countries usually provide that, in the event the local currencies earmarked for loans are not used by the countries because of failure to reach agreement with the United States on the use to be made of the currencies, the United States may then use the local currencies for other purposes authorized by section 104 of Public Law 480.

Agencies authorized to use Public Law 480 currencies may indicate their tentative desires as to their use at the time the proposed sales agreements are formulated. At the time of negotiations of the sales agreement, a country may be sounded out as to its reaction to the proposed uses. The agency proposals on currency uses are not considered a definite earmarking of funds (unless such uses are specified in the agreements), but they are given priority consideration by the Bureau of the Budget in reviewing actual requests for allocation and apportionment of the funds.

The major uses by the Department of Defense of local currency generated under Public Law 480 include:

1. *Common defense.*—Section 104c provides that local currency proceeds may be used to "procure military equipment, material, facilities, and services for the common defense." (Local currencies used for these purposes are not subject to section 1415 of the Supplemental Appropriations Act of 1953 which requires agencies to purchase the local currencies for dollars.) The Department of Defense, for example, has used some of the local currency available under section 104c for mapping programs in South America. The activities financed from funds under section 104c usually represent expedited programs that, in the absence of local currency, would have been justified for inclusion in the regular dollar budget, although phased over a longer period of time.

2. *Payment of U.S. obligations.*—Section 104f provides for the use of local currency to pay U.S. obligations abroad. Use of this local currency is subject to section 1415. In addition to the normal use of local currency under this subsection for accommodation exchange, payment for material, supplies, and servvices, the Department of Defense has utilized such currency to provide housing for military personnel. Public Law 161, 84th Congress, authorizes quarters allowance appropriations to be used to pay for the currencies used for this purpose.

3. *Scientific activities.*—Section 104k provides for the use of local currency for scientific purposes, provided specific appropriations are available therefor. In other words, in the absence of specific authority to use such currencies without reimbursement, the Department of Defense finances research and development programs in foreign countries with appropriated dollars.

C. DEPARTMENT OF DEFENSE PURCHASE OF LOCAL CURRENCY

In its normal day-to-day operations, the Department of Defense purchases its local currency needs from the U.S. Treasury to the extent such currencies are available for sale by Treasury. Only if the U.S. Treasury does not have appropriate currencies available for sale, may a disbursing officer obtain his local currency requirements from authorized banking or local government sources of the particular countries concerned.

D. DISTRIBUTION OF U.S. LOCAL CURRENCY BALANCES, BY COUNTRY

Of the approximately $1.3 billion U.S. Treasury balances of local currency as of December 31, 1958, over 75 percent are concentrated in a few countries—India, Indonesia, Israel, Pakistan, Poland, Spain, and Yugoslavia. In most other countries, local currencies available for sale from U.S. Treasury balances are not large enough to meet regular U.S. agency needs. In European countries such as France, Germany, Netherlands, and the United Kingdom, U.S. Treasury balances which are available or potentially available for sale are not normally large enough to meet Department of Defense requirements. Therefore, while U.S. Treasury balances are showing an increasing total amount, the excess balances are, for the most part, in countries where U.S. agencies have minimum or no requirements. In addition, over 60 percent of such balances are set aside for loans.

E. ACCUMULATION OF LOCAL CURRENCIES

The accumulation of local currencies can be attributed to a number of factors: First, the authority for sales of surplus commodities under Public Law 480 has been increased to over $6 billion. The initial authorization in fiscal year 1955 was $1 billion for the 3-year period ending June 30, 1957. Second, since 1954 the amount of local currencies that are generated from the sale of surplus agricultural commodities under the mutual security program (sec. 402) are deposited in U.S. accounts and are included in U.S. Treasury balances. Third, the United States in making use of the local currencies, must take into account the inflationary problems that could be created by use of such currencies at too rapid a rate. Fourth, for the most part, the local currencies which are accumulating in the U.S. Treasury are not convertible.

MISSILE MASTER

Mr. FORD. In the NIKE-ZEUS program, would you utilize the Missile Master system, or would you find some other comparable program to handle the NIKE-ZEUS defense setup?

General WOOD. In the ZEUS program?

Mr. FORD. In the ZEUS program.

General WOOD. The ZEUS program, Mr. Ford, would have no use for the Missile Master system per se, which is a coordinating system for HERCULES batteries against, as you know, aircraft targets.

(Discussion off the record.)

So the only additional part of any system which will be utilized by ZEUS is the Air Force BMEWS system, which, under the OSD directive, is designed at least in part to furnish early information to the ZEUS system.

Mr. FORD. So NIKE-ZEUS will have no connection with Missile Master and/or SAGE, either.

General WOOD. No, sir. I would say that it is always possible that SAGE or any other source of intelligence might be able to furnish information on the possible launch of a missile or the probable launch of a missile which would be fed, as I understand it, under the plans of General Partridge's headquarters, through a computer in his headquarters directly to ZEUS batteries, where it might serve to give a few seconds' or minutes alert, or it may add to information already available.

But, in general, anything from that source would be bonus, shall we say.

PLATO MISSILE

Mr. FORD. Sometime earlier in the hearings, a sheet was distributed to members of this committee showing the development of Army missile systems, and the first one on that list was PLATO. I have looked

through the various documents which have been submitted for this hearing, and I see no mention of PLATO. Why is that?

General Wood. My memory is pretty good on PLATO, but I think I have the facts accurately here and I would rather refer to them.

PLATO was designed as an antimissile system for the field Army. It was designed to use the ZEUS missile but to have a different type of radar because the problem it had to solve was different. First, it had to solve the problem of shorter range missiles being fired at the overseas Army.

(Discussion off the record.)

General Wood. The radar for this task was essentially the material under development. The program had really never progressed much further than that. The radar was almost ready for testing. It was being built by Sylvania, and I looked at it about a year ago.

Last year, in 1959, the Army programed $5.5 million for PLATO in its budget. This amount was taken out by the Department of Defense before the budget reached the Hill, and put into the ARPA budget. At that time ARPA was new, and the Department of Defense told us that it would handle the problems of looking into antimissile systems in the future which were not for the moment developed into a complet system. That was true of PLATO.

For several months we asked OSD for the return of these funds in orded to complete the work on PLATO, and we were finally told that it had been decided that the contract would be terminated and no further work would be done on PLATO, which action was taken on December 31, 1958.

Mr. Ford. So there is no money in fiscal 1960 for the program.

General Wood. That is right. It is now, shall we say, a nonapproved program.

Mr. Sheppard. Will the gentleman yield?

Mr. Ford. Surely.

Mr. Sheppard. Would you also insert in the record at this point what it cost to terminate the contract?

General Wood. I think I can answer that, Mr. Sheppard.

Mr. Sheppard. Very well.

General Wood. Because the contract was destined to run only to December 31, it expired then. It would have had to be renewed. We knew sometime before that date that it was unlikely that it would be renewed. The total funds spent were $18.9 million since the initiation of the project.

Mr. Sheppard. That was the total amount spent?

General Wood. Yes, sir. There was no cost in connection with the termination.

Mr. Sheppard. There was no cost in connection with the termination of the contract?

General Wood. No, sir.

Mr. Flood. Did you use the expression "it is now a nonapproved program"?

General Wood. That is exactly what I said.

ARPA AND NASA FUNDS TO ARMY

Mr. Ford. Just for the record, would you show the amount that Army R. & D. has received from ARPA for work performed on behalf

of ARPA in fiscal 1959, and what you anticipate would be the case in fiscal 1960; and the same for NASA? You do not have to give it now.

General Wood. I mentioned round figures this morning for 1958 and 1959, for ARPA $80 million, and for NASA approximately $25 million. We will give you the spelled-out figures.

As to what we might anticipate, as of the moment it would still be partly a guess because neither program is that solid so far as to where the work might be done, either in the Army, Navy, Air Force, or civilian areas. But some parts of it are fairly firm, and those we will put down.

(The information requested follows:)

1. As of April 27, 1959, the Army has received $54.128 million from ARPA during fiscal year 1959. Additional ARPA funds in the amount of approximately $22 million are expected to be received during the remaining portion of fiscal year 1959.

2. As of April 27, 1959, the Army has received $20.523 million from NASA during fiscal year 1959. Additional NASA funds in the amount of approximately $13 million are expected to be received during the remaining portion of fiscal year 1959.

3. The Army has no information concerning the amount of funds to be received from ARPA and NASA during fiscal year 1960.

VIGILANTE

Mr. Ford. In this list you have here, what is Vigilante?

General Wood. Vigilante is an antiaircraft weapon, a Gatling machinegun. It is 37 millimeter. We had this project in development to replace the Twin 40 Bofors.

(Discussion off the record.)

Mr. Sheppard. Mr. Minshall.

SOVIET MISSILE DEVELOPMENTS

Mr. Minshall. General, earlier in your testimony you gave us a very interesting discussion about the proposed weapons in the way of missilery for our future infantry divisions, ground support troops, graduated from shorter ranges to longer ranges. What are the Russians doing along that same line, and what are they doing in general with their research and development, insofar as you know?

General Wood. Of course, Mr. Minshall, hard intelligence on details of the Russians' activities is hard to come by. Second, one other than an individual dealing in intelligence probably is risking his reputation to try to interpret what we do have.

Having expressed those two caveats, I will say that last year I showed this committee a film of the Red army's 40th anniversary parade in Moscow which, if you have not seen it, I would be glad to show you sometime. It is essentially a Russian newsreel type of film which we came by through ways unreported, which showed in this parade a tremendous demonstration of mobile equipment.

Specifically, in the missile field it showed self-propelled missiles of the ranges of our HONEST JOHN, or roughly 15 miles; of the range of our LA CROSSE, or roughly 30,000 yards, although the missile was not that type, but it was a self-propelled missile. It showed a missile equivalent to our REDSTONE, of roughly 150

miles. Those missiles were all shown in the parade either self-propelled or towed in such a way as to be mobile.

(Discussion off the record.)

In addition to the missiles, they showed a considerable amount of other equipment, including personnel carriers, artillery, antitank guns, antiaircraft guns, and tanks.

Mr. FLOOD. Very good amphibious river crossing stuff; first class.

General WOOD. Yes. It would indicate to us that the Russians have not given up the idea of being able to fight a war on land.

ADEQUACY OF FUNDS

Mr. MINSHALL. In your opinion then, do you think that our research and development program on our Army ground weapon procurement program is progressing fast enough? Do you feel that you have sufficient funds to do all you should and still do it reasonably well?

General WOOD. From the standpoint of procurement you only have to go back to the statements made by the Secretary of the Army and General Taylor indicating they felt the procurement account was woefully inadequate even to replace stocks which are wearing out, much less to buy new weapons, and therefore the Army has to compromise in what it buys in new equipment and gets less than what it would like to have.

WEAKNESS IN PROCUREMENT PROGRAM

Mr. MINSHALL. Where do you think our main weakness is in our procurement program? Where would you personally like to see additional funds, and in what amount generally?

General WOOD. You are getting me out of my field. I would like to turn to my procurement advisers and get their reaction.

General LINCOLN. Are you asking for my personal opinion?

Mr. MINSHALL. Your personal opinion.

General LINCOLN. My personal opinion is that we should first——

Mr. MINSHALL. I want your answer without rephrasing or restating General Taylor's answer that he gave up here a month or so ago.

General LINCOLN. This is my opinion. We should first buy more of what we call modernization items, conventional type items, in the electronics and communications fields, in conventional type weapons—ammunition—and in logistic support-type items, and if we were to get additional money of course we should increase our buy of missiles so that we will have a greater capability there. I would feel before increasing our missile buy we should increase our buy of the modernization items.

General WOOD. May I add to that?

Mr. MINSHALL. Yes.

General WOOD. You are really opening up an area in which there are a lot of factors. You will recall that either the Secretary or the Chief of Staff described the fact that the Army prepared what it called an objective budget, which was greater than what is in the defense budget. It was on the order of about $13 billion. I am quite certain that was made available to the committee. It was a list of

priorities of how that additional money would be spent if it were made available, either in whole or in part.

Mr. MINSHALL. We got all that information.

General WOOD. The first part of that was a staff-prepared list, and as General Lincoln said, increased the modernization of the pentomic field army in areas other than missiles. That took care of the first $500 million, roughly.

The second priority was NIKE-ZEUS. The third was the increase in the Army's strength. The fourth was increasing strength in the Reserve components. It was not until we got to priority 5 that we believed if additional funds were made available we should increase our missile program.

NIKE-ZEUS

Mr. MINSHALL. Perhaps this is asking for an anticipated answer, but what is your honest opinion of NIKE-ZEUS? Do you think that we should proceed with the program now formulated.

General WOOD. Since you have asked the question, the answer is "yes." I would like to add some footnotes. I would like to explain why I say that.

(Discussion off the record.)

We must have a protected offensive capability. The Army feels that the country would be negligent in not going into the production of NIKE-ZEUS.

It is true that there is a difference in scientific opinion as to how successful the system would be. I have not heard any informed opinion—and I will not include Admiral Hayward in that; I talked to him this morning—which would say that the system is not capable of at least partial success.

Mr. MINSHALL. What do you mean by "partial"?

General WOOD. When I say that I mean that the scientists are more ——— than they are about the working of the basic system.

The Army has tremendous confidence in the system; first, because it is being worked on by the same Western Electric-Bell Laboratories-Douglas Aircraft combination which has produced successfully the AJAX and the HERCULES. While there have been major changes from those two systems, the ZEUS is still a member of that family in many ways.

For example, its target tracking and missile tracking radars are very, very similar.

Mr. MINSHALL. Is it your considered opinion that we should go into the production end of the NIKE-ZEUS?

General WOOD. We can go into production.

Mr. MINSHALL. Is it your opinion that we should now in the next fiscal budget?

General WOOD. It is my opinion that we should take the decision to initiate the production with the least possible delay because we cannot, no matter how much money we spend——

Mr. MINSHALL. Do you think that decision should come as early as in the fiscal budget for 1960?

General WOOD. I do. I think if we do not take it we are wasting a lot of money on the research and development aspects of ZEUS.

Mr. MINSHALL. I asked General Trudeau the same question. The distinguished gentlemen of the Army are the only ones who strongly support the NIKE-ZEUS program. The Air Force, the ARPA people, the Navy, all of them say the program is pretty much like buying a pig in a poke.

General WOOD. Well, as I say, I do not know exactly the motivation of the individuals who testified before you, but I can indicate some possible assumptions for that reasoning.

The first one I would say is that the program is an expensive one, and at times of what appears to be a rather fixed defense ceiling on expenditures, it is unlikely that other competitors for that money would approve of what looks like a rather big item in somebody else's budget.

Mr. MINSHALL. We always have to have a ceiling on our expenditures. We cannot go hog wild in our expenditures and be panicked into buying something that we cannot really afford.

General WOOD. That is the assumption of one possible reason for that. Another, and perhaps a more sincere one, is the feeling that not all of the parts of the system have yet been proved, and it is better to wait and prove them before going into production.

A third reason perhaps is the feeling that we should not spend any more money on defensive aspects than we have to; we should put it on offensive material, within the same available funds.

However, I would say you have not necessarily talked to everyone because OSD itself is divided on this question, and there are those who feel that we should go into production.

Mr. MINSHALL. All I can say is that there has not been a single one outside of the Army ground forces—and correct me if I am wrong—that has come up with the idea that NIKE-ZEUS is the proper thing. It is hard for me to believe having listened to all this expert testimony, that by going into the NIKE-ZEUS program we will not be buying a pig in a poke.

General WOOD. Might I comment on what you call "experts"?

Mr. MINSHALL. They are your colleagues in the armed services and you can say anything you want to about them.

Mr. SHEPPARD. May I say to you, General Wood, this is a matter of evaluation upon the part of individuals, is it not?

General WOOD. Yes.

Mr. SHEPPARD. Over and above what the gentleman is referring to, there has been established within the Department of Defense a procedure of determination. That is done by certain people, be they right or wrong. The determinations have been made. Whether or not the determinations are proper at the moment, I do not know, and I do not know whether you know. You have a right to your idea, but when it comes to evaluating other people's thinking I am going to assume that they have the same background of integrity that we all have. They might have a little prejudice in some directions, but that is human. I think this is a matter that has already been determined and that there is not much that you can do about it at the moment.

General Wood. That is correct. I agree with you completely. I was only giving my opinions as asked by the Congressman as to what I personally thought. I was going to qualify the Army, if not myself, in this area as having some experts, because the Army has been in the surface-to air missile business longer than anyone.

Mr. Minshall. May I interrupt. I do not doubt the Army has experts who are just as highly trained, or many better trained than those in the Air Force or the Navy, but what confuses me is that all of these people—and I do not doubt their integrity for 1 second—cannot agree. They are either for or against. There have been other things on which there has been a shade of doubt, but on this NIKE-ZEUS question it has been clear cut; it is either good or useless, and the vote is overwhelmingly against NIKE-ZEUS.

General Wood. I have no further comment unless you want to ask me a question.

Mr. Minshall. I have no further comment.

Mr. Flood. Let me tell you this, General. The same experts from all the same departments—from top to bottom—also said, and also urged, and also defended and pleaded here for all the money they could get for the SAGE system and for the BMEWS system when it was not in any better shape than the NIKE-ZEUS system is today. Don't forget that. Add that to your answer.

DUPLICATION OF R. & D. EFFORT

Mr. Minshall. I have one other question and I would like your opinion on this. We have heard much testimony on research and development and procurement. I am convinced that there is a great deal of overlapping and duplication resulting in waste, not only within the departments themselves but especially as between the BOMARC and weapons systems in other services. I wonder if you would care to comment. Do you believe that there is a terrific amount of overlapping and waste in the military program today?

General Wood. Well, as Mr. Sheppard said, decisions have been made by sincere people on levels higher than mine as to what the program should be, and I do not know of any particular reason why I should comment. For example, I am certainly less an expert as to whether the Navy should have more aircraft carriers than Admiral Hayward is on whether the Army should not have NIKE-ZEUS. I would hate to give an expert opinion.

Mr. Minshall. I think that you are evading the issue a little. Do you not feel that it would be better if we considered these on a line item basis? We would know that we would not have a whole line of weapons designed to do the same job when perhaps two or three of the same type of weapons would do the job. You have a situation in the Department of the Army where you are getting 155 millimeter howitzers, 175 millimeter guns to do a job when now or in the immediate future missiles are going to be doing that same kind of job. Do you not think that that is an example of duplication and waste?

General Wood. No, sir, because I think use can be shown of those weapons that you have mentioned which is not necessarily duplication.

On the question of surface-to-air missiles—certainly, if funds are available, it would be desirable for a commander of a defense to have

a mix of missiles. It would be desirable because he would then be able to take on different targets with different missiles. He would be able perhaps to use a long-range missile and then eventually a shorter range missile. He could certainly make it more difficult for the enemy to use electronic countermeasures if he has differing systems.

Having said that, again I come back to the Chief of Staff's feeling that, since there is not all the money available that everybody wants, we should be able to establish some criteria of what is adequate, what is sufficient for the job, and rest on that. And in the surface-to-air missile field, it is a field, as I started to say earlier, in which the Army has more experience than any service in any country in the world. It is the U.S. Army that I am talking about. The U.S. Army put the NIKE-AJAX in the field in 1953. It has fired over 3,000 of them.

It has put the HERCULES in the field behind it.

You compare those records to the BOMARC, a system which has been in development for upward of 9 years, and you come out with something like this: you come out with a statement which would say the BOMARC has fired one-third of the missiles in twice the time at twice the cost and half the efficiency of the HERCULES. What do you do?

Mr. MINSHALL. In other words, you feel that BOMARC, compared with NIKE-HERCULES, is an example of overlapping and duplication; is that correct?

General WOOD. I tried to elaborate in the beginning——

Mr. MINSHALL. Is not that what you have just stated?

General WOOD. If one could buy everything, one would buy both. If one were forced with a choice with the funds available, and I had the choice, I would not spend a penny on BOMARC.

Mr. MINSHALL. In other words, it is a good example of overlap and duplication, as far as you are concerned?

General WOOD. Those two words are at least applicable.

Mr. SHEPPARD. The chairman wants to thank you gentlemen for your responses.

General WOOD. Thank you, Mr. Chairman. It has been very pleasant to be with you.

Mr. SHEPPARD. The committee will stand adjourned until 10 o'clock tomorrow morning.

MONDAY, APRIL 27, 1959.

CHEMICAL, BIOLOGICAL AND RADIOLOGICAL WARFARE

WITNESSES

MAJ. GEN. MARSHALL STUBBS, CHIEF CHEMICAL OFFICER
MAJ. GEN. D. W. TRAUB, DIRECTOR, THE ARMY BUDGET
LT. COL. DOUGLAS LINDSEY, DEPUTY DIRECTOR, MEDICAL RESEARCH, CHEMICAL WARFARE LABORATORY
DR. BERNARD P. McNAMARA, CHIEF, TOXICOLOGY DIVISION, MEDICAL RESEARCH, CHEMICAL WARFARE LABORATORY

Mr. MAHON. The committee will come to order.

Our schedule this morning is to listen to this presentation for an hour and then at 11 o'clock hear Admiral Rickover in connection with one of the problems confronting us.

General Stubbs, we are pleased to have you here. Mr. Sikes has been most interested in this presentation and has discussed the matter with me and other members of the committee. How do you think we can best proceed?

General STUBBS. I have, sir, a prepared statement. I also have a series of film clips and a demonstration of one of the incapacitating agents if you care to have it. I can give it in that order.

Mr. MAHON. Yes. Do you think that you can do it conveniently in an hour?

General STUBBS. It will take just about an hour to go through it.

Mr. MAHON. I suggest that we let him proceed without any interruption.

STATEMENT BY MAJ. GEN. MARSHALL STUBBS, CHIEF CHEMICAL OFFICER

General STUBBS. Mr. Chairman and members of the committee: I am pleased to appear before you to discuss the Army's programs in chemical, biological, and radiological warfare. I should state here that the Army's programs are, for all practical purposes, the Defense Department's programs, since the Army is responsible for the coordination of all military research and development in chemical and biological warfare for the Army, Navy, Marine Corps, and Air Force. We also fill the logistical requirements of these services for chemical and biological materiel and equipment.

I consider it of vital importance that you be kept informed of the status and progress of these programs for two reasons: first, it is my firm conviction that these weapon systems can provide us with an important deterrent to war and, second, I believe there is a real possibility that the Communists will use chemical and biological weapons in a future war. Russian leaders, both political and military, have openly stated that the next war will include the use of chemical and biological weapons. A senior admiral (Gorshikov), for example, stated that future war will be characterized by, and I quote, "various means of mass destruction, such as atomic, thermonuclear, chemical, and bacteriological weapons," end quote.

The Russians are intensively conducting research and development in chemical and biological warfare and they are known to have a number of chemical-agent production plants. Their interest is not just limited to lethal agents, but actually encompasses a wide variety of agents ranging in effect from those mildly incapacitating to those producing death.

Russian Army and Navy training in chemical, biological, and radiological warfare is realistic. The civilian population is being trained in defense; and the military and civilian equipment is of excellent quality.

It seems to me that the deep interest of the Soviets indicates only one thing—that they will take the initiative in waging chemical and biological warfare and that they actually plan to do so if it is to their advantage. I cannot believe that they would expend their critical resources for any other purpose.

Communist interest in these fields is not just limited to the Russians, but is also of active concern to Red China and the satellite nations.

CHARACTERISTICS AND CONCEPTS

Chemicals and biologicals have certain unique advantages which are not found among other military weapons systems.

First, they are search weapons in that they seek out the enemy whether he is widely dispersed or concentrated in fortifications. Like a fog they blanket an area and penetrate all crevices. Thus they will reach personnel physically protected from blast, thermal, or fragmentation weapons.

Second, chemical and biological agents offer a wide variation of effects, ranging from highly lethal down to the mildly incapacitating. This provides a flexibility unknown with the high explosive and nuclear systems.

Third, toxic chemical and biological warfare are minimum destruction weapons as far as materiel is concerned.

They are directly effective against personnel and they leave intact the cities and industries which are destroyed by high explosives and nuclear weapons. I need not point out the importance of this, both in the case of captured facilities and in the reestablishment of the general economy at the end of a war.

And finally, in terms of critical materiel and total cost, chemical and biological warfare would produce major effects with a comparatively minor logistic effort.

EMPLOYMENT CONCEPTS

Concepts of employment of chemical and biological warfare have been developed to make maximum use of these unique properties. Nonpersistent nerve gases are particularly adapted to the generation of toxic vapor clouds for attack of hard targets such as concrete redoubts and underground fortifications, while persistent gasses produce effects both by inhalation and absorption through the skin. Since these type agents readily penetrate clothing, they could be employed effectively against masked personnel. Incapacitating agents, which you no doubt have read quite a bit about recently, are capable of upsetting behavior patterns and produce temporary mental and physical incapacitation without permanent injury.

Biological warfare could be employed by an enemy against us in two ways, either by the limited target type of attack or the large area coverage type of attack. The first, the limited type of attack, can be accomplished by on-target application of various types of bombs from either aircraft or missiles; or by off-target attack employing spray from aircraft, drones, or by other generating devices. Since an airborne biological warfare attack is difficult to detect, an off-target attack with subsequent cloud travel to cover the target could readily be accomplished by the enemy.

The second type of attack an enemy might use involves the attack of large land masses with aircraft and/or missiles, each dispersing large quantities of biological agents. This is the large-area coverage type of operation. The two concepts differ only in one respect—in area covered.

CURRENT STATUS AND FUTURE CONCEPTS

Concerning our status and future prospects: Major advances in chemical warfare agents and munitions have been made in recent years. Agents are now available which are 10 to 50 times more toxic than those available a few years ago. Concurrently, more effective means for delivery of these agents are being developed. In addition to the known aircraft spray systems, aerial bombs, and ground munitions, guided missiles and rockets filled with toxic agents will pose a grave threat.

We are giving increased attention to the study of incapacitating agents, which I mentioned previously.

What about defense against enemy use of chemical and biological warfare? The basic problem we face here is to provide the individual fighting man with adequate protection without overburdening him to the point where his combat capability is seriously affected.

I am pleased to state we are planning early production of our new canisterless protective mask, which is a decided improvement over our previous mask in wearability and in ease of breathing.

We, together with the Army Quartermaster Corps, are giving high priority to developing a three-way impregnation system which will make general issue Quartermaster clothing self-indicating and self-decontaminating and at the same time prevent penetration through the fabric.

Along with the Surgeon General, we are investigating promising compounds for the prevention, as well as the treatment of chemical and biological warfare casualties. Our continuing objective is to provide the soldier with simpler and more effective methods of protection.

RADIOLOGICAL DEFENSE

In the area of radiological defense, the Chemical Corps is conducting an active program. We are studying the problems associated with radioactive fallout and we are investigating gamma and neutron shielding to obtain data needed for operational protection and for new equipment, tactics, and doctrine. We are expanding our training and educational programs, and we intend to take whatever steps are necessary to develop Chemical Corps officers as the Army's experts in radiological defense. We are continuing our work in chemical dosimetry, and a tactical gamma-neutron dosimeter is scheduled for standardization in 1960.

And finally, we plan the establishment of a radiological test center at the U.S. Army Chemical Corps Proving Ground, Dugway, Utah, to provide a facility to simulate the fallout fields which may occur in nuclear war.

DEMONSTRATION OF INCAPACITATING AGENT

Colonel LINDSEY. We will demonstrate to you a compound which is under study as an incapacitating agent.

The human body is a complex machine subject to all sorts of malfunctions. The only problem with incapacitation is that one has to produce the malfunction without pushing the destruct button.

We can incapacitate by producing mental effects, and I might say one does not have to drive the man completely crazy. All you need to do, for example, is to destroy his ability to integrate time and distance, in which case he cannot fly a jet airplane or land one on a carrier or aim a gun at or from a moving tank.

General Stubbs has mentioned some agents of a physical incapacitation type which cause physiological blindness, convulsions, paralysis, rigidity, or alternation between the two, Parkinsonism, and others.

We would like to demonstrate to you a physical incapacitating compound. The actual demonstration will be handled by my colleagues, Dr. McNamara, Mr. Owen, and Mr. Weimer.

This is perfectly safe to you and it is painless to the animals.

Dr. McNamara. I would like to emphasize one point. This compound is about 1,000 times more potent than the best pain reliever available to medical science today.

This is an aerosol exposure chamber.

We will maintain this chamber in negative pressure so no material will enter the room.

We will first turn on the generator. The aerosol now is coming from the opening on the left. You cannot see it here because in these concentrations this material is invisible.

Of the material coming from that bottle of 99.9 percent solvent and only one-tenth of 1 percent is the actual agent.

These animals are whining because they do not like the sound of the motor.

We have now reached 45 seconds. We will count off the last 10 seconds for you.

That is the end of the exposure. We will turn off the aerosol generator. We will allow this to run for a while to make sure none gets out into the room.

Already these animals can no longer move. These effects will become a little deeper as time goes on, and after about a half hour they will start to recover.

To show you that this is a temporary thing, we have an antidote we brought along that we will use to revive one of these animals.

Colonel Lindsey. The fact we have this antidote does not militate against the effectiveness of this agent in the field. You cannot make every enemy soldier a physician to diagnose his own illness and carry his own treatment. This is highly effective and we use this to artificially bring back the animals so you can see the recovery is complete.

Some of you have seen this before and you may recognize the dogs. They have been through this many times. They are usually better behaved than this, however.

Mr. Mahon. Does medical science use this material?

Colonel Lindsey. The compound itself or the antidote?

Mr. Mahon. The compound itself.

Colonel Lindsey. The antidote is used fairly frequently but the drug itself has appeared as an experimental item in the medical literature, but only as a pain relieving agent.

Dr. McNamara. It is less than 2 minutes since this animal had the antidote and he is coming out of it. As you will see in a minute this animal will make a complete recovery before we leave here.

Mr. Mahon. Have you completed the presentation, General?

General Stubbs. One further summarization.

Looking into the future I am certain we will see major advances in the art and sciences of chemical and biological warfare. The application of discoveries in science and technology to these warfare systems will result in orders of magnitude increases in effectiveness and capability.

I need not point out that this will require unrelenting effort and adequate support. I feel we cannot afford to be too little and too late in chemical and biological warfare. We in the Army shall make every effort to see that this does not happen.

That completes my statement.

Mr. MAHON. Gentlemen, you have made a very provocative presentation in a field which is, no doubt, of great importance to our defense effort.

What are the items included in the budget for chemical, biological, and radiological warfare?

General STUBBS. I shall insert that information in the record.

(The information requested follows:)

Items for chemical, biological and radiological warfare

[Thousands of dollars]

	Fiscal year 1960 [2]	
	Total requirements included in Chemical Corps original budget submission	Amounts tentatively approved by Department of the Army
Chemical biological and radiological (research and development)	$65,000	$38,907
Procurement (including support of research, development, test, and evaluation)	28,374	9,523
Industrial mobilization (procurement of equipment and missiles, Army)	16,299	6,167
Tactical forces	2,166	2,026
Training activities	1,963	1,755
Central supply activities	22,485	18,122
Major overhaul and maintenance of materiels	1,158	911
Army-wide activities	1,536	1,287
Other	209	190
Total	139,190	78,888
Recap by appropriation:		
Research, development, test, and evaluation	(72,324)	(39,730)
Operation and maintenance, Army	(29,517)	(24,291)
Procurement of equipment and missiles, Army (excluding support of research, development, test, and evaluation)	(37,349)	[1](14,867)

[1] An additional $22.5 million is contained in the category II (overprograming) list furnished to DCSLOG. These items will be funded to the extent that additional funds will be made available.

[2] Excludes military construction, Army.

(Additional classified information will be furnished the committee.)

EFFORT BEING EXPENDED ON CHEMICAL AND BIOLOGICAL WARFARE

Mr. SIKES. Do you feel that the appropriate national effort is being expended for these weapons systems to contribute their appropriate share to the national defense posture?

(A classified answer was submitted.)

Mr. SIKES. I ask the same question with regard to the offensive capability of our allies.

(This answer is classified and has been furnished to the committee.)

Mr. SIKES. What is the status of the Chemical Corps arsenals? Do we still need all the arsenals that we have?

I ask the same question with regard to the manufacturing plants that are operated by or are under contract to the Chemical Corps.

(This answer is classified and furnished to the committee.)

Mr. SIKES. What do you consider as minimal maintenance of your arsenal? I ask the same question regarding the manufacturing plants which are the Chemical Corps listing.

(A classified answer has been furnished.)

Mr. SIKES. I would like to be sure that there is an adequate program of research and development on the incapacitating agents, examples of which we have seen, which I think might well be called mercy weapons in that they do not kill or destroy people or destroy property. If there is not an adequate program of research and development, I would like to know—and I would like to know your personal position and not the budget position—the dollars needed for 1960 in comparison to the dollars available for 1958 and 1959.

(The answer to this question is classified.)

SOVIET CAPABILITIES

Mr. SIKES. I would like to know Russian capabilities insofar as we have been able to determine for carrying on warfare through chemical, biological, or radiological agents.

(A classified statement has been submitted.)

LEVEL OF U.S. EFFORT

Mr. SIKES. I would like to know the level of the Chemical Corps inventory and the size of the effort in this field as shown by appropriations.

What I mean is this: I would like to know whether, although the level of appropriations has been fairly current during the last 2, 3, or 4 years, there has been a constant level of activity or whether increasing costs and other limitations have actually caused the size of your effort to be reduced although the number of dollars appropriated has remained fairly constant. The complete story on this problem would be helpful to the committee.

(The information requested follows:)

1. The level of Chemical Corps inventory is $145.9 million, consisting of $72.3 million in general supplies; $52.4 million in ammunition and toxics; and $21.2 million in stock fund items. This inventory value is based on current pricing information in that, as known price increases occur, upward inventory adjustments are made. Considerable modernization of this inventory has occurred in recent years, as shown by the fact that $174.2 million in inventory, including $108.4 million of obsolete items and $18.9 million of unserviceable items, have been disposed of since 1956. In addition there are $76.2 million in inventory (not included in the $145.9 million) currently under disposal.

2. Appropriations for the purchase of PEMA and stock-fund items in recent years have been as follows:

Fiscal year:	
1955	$21,000,000
1956	20,900,000
1957	24,700,000
1958	18,900,000

Although current assets on all items do not meet total ASOP 1961 requirements, planned procurement through fiscal year 1963 is expected to raise the level of inventories to meet requirement forecasts.

3. In view of increased costs, relatively speaking, a fairly constant level of funding for new procurement during the past several years has been necessary to support declining troop strength.

4. Over the past few years, steadily mounting costs have been a major factor in depleting the size of our defense dollar, and in turn the level of our CBR effort in the Chemical Corps. Perhaps one of the best ways of showing this is by the shrinkage in manpower return on payroll dollars invested. For example, from a total of some $52 million paid out in salaries to the total operating civilian workforce of the Chemical Corps during fiscal year 1953 we were able to realize about 13,000 man-years of effort. During fiscal year 1959, for nearly the same payroll ($48 million), we expect a return of only 8,000 man-years, or a reduced effort approximating 33 percent. Although we have benefited from normal technological advances and improved management efficiency these gains have not been nearly enough to offset salary increases over the same period.

Chemical Corps civilian workforce

	Total payroll (millions)	Man-years (thousands)
Fiscal year:		
1953	52	13
1954	56	13
1955	57	12
1956	57	12
1957	55	11
1958	50	9
1959	48	8

TD civilian personnel—Authorized and actual strength

End of fiscal year	Total		Graded		Ungraded actual
	Authorized	Actual	Authorized	Actual	
1950	6,558	6,115	----------	2,611	3,504
1951	10,280	9,638	5,145	4,193	5,444
1952	13,569	12,111	5,501	5,349	6,762
1953	13,784	13,119	6,350	6,081	7,038
1954	13,696	12,567	6,498	6,255	6,312
1955	12,383	11,865	6,540	6,286	5,579
1956	12,129	11,648	6,479	6,216	5,432
1957	10,694	10,683	5,961	5,940	4,743
1958	8,914	8,750	5,406	5,374	3,376

Current Source: RCS CSGPA 523 (DA Form 1043).

Financial summary—As of June 30 each year shown

[In millions]

Fiscal year	Funds available [1]			Obligations			Expenditures		
	Total	DA (CmlC)	Other agency	Total	DA (CmlC)	Other agency	Total	DA (CmlC)	Other agency
1954	$466.4	$158.5	$307.9	$118.1	$70.7	$47.4	$204.6	----------	----------
1955	318.4	113.3	205.1	107.3	72.4	34.9	151.9	----------	----------
1956	208.7	115.5	93.2	95.3	79.0	16.3	115.6	----------	----------
1957	179.1	120.4	58.7	88.2	82.2	6.0	114.8	$84.2	$30.6
1958 [2]	137.1	106.1	31.0	80.8	76.4	4.4	92.0	72.5	19.5
1959 [3]	115.2	103.0	12.2	76.3	71.8	4.5	84.9	77.2	7.7

[1] New obligational authority and carryover.
[2] Excludes funds for classified facility ($24.8 million)
[3] Planned as of Dec. 31, 1958; excludes classified facility.

Current Source: RCS CMLC-3 & CMLC-4.

Mr. SIKES. I would like to know the amount of money requested by you for fiscal 1960 of the Department of the Army for your entire program and I would like to know what items were necessarily eliminated as your request was screened.

In connection with that I would like to have your personal opinion as to the items which should be included in this program but were left out for budget reasons.

This information is classified and for security reasons should be "off the record."

Mr. SIKES. I would like to know whether your R. & D. budget has been evaluated for the increasing dollar costs of activity and services and material.

General STUBBS. Yes, sir.

(This information is classified and has been submitted.)

BIOGRAPHY OF GENERAL STUBBS

Mr. NORRELL. The biographical sketch of the general here is very interesting.

With your permission I would like to insert that in the record at this point.

Mr. SIKES. Very well. That may be done.

(The biographical sketch referred to follows:)

MAJ. GEN. MARSHALL STUBBS, CHIEF CHEMICAL OFFICER

BRIEF BIOGRAPHICAL SKETCH

Marshall Stubbs was born in Superior, Nebr., June 13, 1906. He was graduated from the U.S. Military Academy in 1929, serving with the Infantry until 1934 when he transferred to the Chemical Warfare Service. He is a graduate of the Infantry School, Chemical Warfare School, National War College, Command Management School. He obtained a master of science degree in chemical engineering practice from the Massachusetts Institute of Technology.

During World War II, General Stubbs served in the European Theater of Operations as chemical officer of the 8th Air Force Service Command and later with the 9th Air Force Service Command where he organized the chemical section of the headquarters. In 1944, he was assigned to the advance section, communications zone, as chemical officer, and then AC/S G–4.

After the war he served as chief of the communications zone section of the European Theater General Board and later served in G–4 offices of the U.S. Forces, European Theater. In 1947, General Stubbs was assigned to the Army Chemical Center. He served as Chief, Research and Development Division in the Office of the Chief Chemical Officer until 1954, when he was assigned as commanding officer and later commanding general, Chemical Corps Materiel Command. In 1957 he went to Fort Bragg, N.C., as commanding general, 1st Logistical Command. He was in that post when appointed Chief Chemical Officer in September 1958.

His decorations include the Legion of Merit, Bronze Star Medal, the Commendation Medal (with the oak leaf cluster) and several foreign decorations.

PINE BLUFF ARSENAL

Mr. NORRELL. I notice your biological warfare facilities in Arkansas. That happens to be in my congressional district, General.

I wish you would insert in the record as much information as is available for public use in connection with this item.

General STUBBS. Yes, sir.

(The information requested follows:)

PINE BLUFF ARSENAL

1. The U.S. Army Chemical Arsenal at Pine Bluff, Ark., is one of the three Chemical Corps arsenals. The principal functions of this arsenal are the manufacture, storage, supply, and renovation of Chemical Corps munitions. It consists of an arsenal operations organization; a biological operations organization; and the Midwest Chemical Depot.

2. The arsenal operations organization is involved in the production of Chemical Corps munitions including toxics, smoke, and incendiaries for the Department of Defense. The biological operations organization is engaged in maintenance of a state of readiness in biological warfare in accordance with appropriate Department of Defense directives and an Air Force operational plan and the accomplishment of appropriate development work required to improve the manufacturing process of biological agents. The Midwest Chemical Depot stores and distributes and renovates Chemical Corps materiel.

3. Department of the Army 5-year programing provides for the retention of scarce skills at Pine Bluff Arsenal through 1964. The estimated annual sales rate is $8 million. The current level of employment is 1,157 civilians and 166 military. The production program at Pine Bluff Arsenal is designed to retain personnel having the skills required to handle pyrotechnics as well as biological operations.

CROP AGENTS

Mr. SIKES. Might I suggest that although the film we have seen did not show the development of any crop agents, the bacteriological warfare field does include crop agents and animal agents as well as agents for use against humans, and it is entirely possible that that would be the type of agent emphasized rather than the use of agents against humans.

Is that not correct?

General STUBBS. This very well could be, sir.

Mr. SIKES. Similar distribution methods would be used. Is that correct?

General STUBBS. Very similar ones. They are not the same ones. We have a much larger area to cover.

WEATHER

Mr. FLOOD. I suppose you will develop that further in reply to Mr. Sike's questions on the record. I think you should.

Heretofore we have spent a lot of time on that in these other hearings.

Do you work with the weather people, both for anticrop, antianimal and antipersonnel operations?

General STUBBS. Yes, sir.

Mr. FLOOD. But you are not using weather as a weapon. That is not your shop?

General STUBBS. We do not have any shop at the moment on that. Anything pertaining to weather as a weapon does not rest with us.

Mr. FLOOD. Even insofar as chemicals are concerned and the use of chemicals in weather movement?

General STUBBS. Not insofar as controlling the weather is concerned; no, sir.

SOVIET CIVIL DEFENSE

Mr. FLOOD. I would like you to put in the record a paragraph or so concerning the degree of Soviet Russian civil defense.

General STUBBS. Yes, sir.

(This information is classified and has been furnished to the committee.)

DETECTION DEVICES

Mr. FLOOD. Give us something further on what you are doing, if anything, in detection, both widespread detection in civilian areas, limited military areas, wide military areas.

General STUBBS. Yes, sir.

Mr. FLOOD. Tell us about detection devices, et cetera.

(This information is classified and has been submitted to the committee.)

NATIONAL POLICY

Mr. FLOOD. Tell us something further with reference to your statement of policy, your new statement of policy. I take for granted your statement of policy on page 3 is still the policy as of today so far as you know?

General STUBBS. Yes, sir.

Mr. FLOOD. Will you develop it with reference to limited war?

General STUBBS. Yes, sir.

(This information is classified.)

(Discussion off the record.)

Mr. FLOOD. I am curious to see how this will be operational and under what circumstances as you refer to it on page 3.

There are a number of other things I would like to ask you but we have a time limit here.

The last sentence on page 5 interests me because one of our chief problems with reference to nuclear warfare is what would happen in Western Europe. I am seriously concerned about the Russian ground forces. Nobody else around here is, because they are all flying high with nuclear warfare. I am more concerned about the Russian ground forces than I am Russian ballistic missiles, and I believe they can be at the Channel in 48 hours.

That being the case, obviously we have a problem of whether we are going to attack Western Europe with nuclear weapons, and under what circumstances, limited, ballistic or otherwise, limited in area, or ICBM or IRBM, and since that is a question of great debate you think you have the answer.

You say, "These could be used for the humane accomplishment of difficult missions such as dislodging an enemy from an area inhabited by a friendly population."

General STUBBS. Yes, sir.

Mr. FLOOD. I take for granted, if the situation I am talking about were developed, you are prepared to dislodge the Russian armed forces from Western Europe as you have indicated.

I would like you to develop that for the Army War College perhaps.

General STUBBS. All right, sir.

(This information is classified and has been submitted to the committee.)

Mr. FLOOD. That is all, Mr. Chairman.

Mr. RILEY. No questions.

Mr. BOYLE. I have no questions.

EFFECT OF PREVAILING WINDS

Mr. FLOOD. This relates to the problem of prevailing winds. Are you utilizing the prevailing winds concept? Is that your job or do you turn over to the weather people your weapons?

Do you sample test and utilize this for dissemination?

Mr. SIKES. If I might elaborate on that: What would be the effect of prevailing winds on the use of BW and CW agents?

General STUBBS. We have this well studied and I can give you an answer now, it will take a little while to do it, or include it in the reply you would like me to make for you.

We have nothing so far as controlling the weather. We do use the prevailing winds.

Mr. SIKES. Assuming the prevailing winds are to the east.

Mr. FLOOD. We have been pursuing it on this business of radiation for several years, especially the last year and a half.

We were wondering about this. I assume you will develop it.

General STUBBS. Yes, sir.

(This information is classified and has been submitted to the committee.)

PRODUCTION LEADTIME

Mr. FORD. What is the leadtime on most of these agents you have discussed? I refer to production leadtime.

General STUBBS. Off the record.

(Discussion off the record.)

General STUBBS. Generally speaking we should be able to come up with a chemical process in 3 years or less.

Mr. FORD. For real production facilities?

General STUBBS. Yes.

Mr. FORD. Once you get into production I presume you can produce much more than you might need in a relatively short period of time?

General STUBBS. Well, we probably would have to stockpile. We would not want to put in enough manufacturing facility to be able to produce all that we need in a short time, sir. It would probably be much cheaper for us to stockpile it than put in production facilities.

Mr. FORD. That is all.

Mr. WEAVER. I have no questions.

Mr. SIKES. General Stubbs, we appreciate very much the opportunity to hear and witness this presentation. Thank you for being with us. It has been very interesting and very informative.

MONDAY, APRIL 27, 1959.

U.S. NUCLEAR POWER PROGRAMS

WITNESSES

VICE ADM. HYMAN G. RICKOVER, NAVY BUREAU OF SHIPS
ACCOMPANIED BY:
COMDR. V. A. LASCARA, USN, SPECIAL ASSISTANT TO ASSISTANT DIRECTOR, NAVAL REACTOR, AEC

Mr. SIKES. Do you have a statement for us, Admiral?

Admiral RICKOVER. I do not have a statement. I believe I was to come here to answer such questions as the committee might ask me.

Mr. SIKES. Admiral Rickover, you were invited to come here in order that we might discuss with you the adequacy of the atomic submarine program, and to request your suggestions about any inadequacies that in your mind exist in the naval program.

We would like you to be completely factual and frank with this committee, as you always have been.

We want your personal opinion and not the budget recommendations on this matter.

As you know, any part of this record which cannot be made available to the public is kept for the committee's use only and not shown to any unauthorized personnel.

I shall open this, Admiral, by asking a few questions.

One, the nuclear propulsion of ships is one area of national defense in which we appear to have built up a commanding lead over the Russians. Nuclear power has made the submarine a new weapon, as yet untried in actual warfare. Just how effective would you expect it to be in all-out war?

Admiral RICKOVER. I would like to answer that question more in the context of the very first question you asked me, sir, as to what I thought of the adequacy of our nuclear shipbuilding program. I think I can develop it better that way, sir.

Mr. SIKES. Very well; proceed please.

NUCLEAR POWERED ATTACK SUBMARINES

Admiral RICKOVER. I believe our submarine program is adequate for the POLARIS type. It is not at all adequate for attack submarines, and by attack submarines I mean the latest type such as the *Skipjack* or the *Skate*.

For the information of your committee, and this is secret, of course, the *Skipjack* can make ——— knots. We actually made that speed when the Joint Congressional Committee on Atomic Energy was on board her 2 weeks ago. That is about as fast as any naval vessel can go, practically.

For example, I have been on a battleship where we were making almost full power, yet on account of the weather and the rough seas we could make only 8 knots, instead of the design full speed of 21 knots but a submarine operating below the surface can, of course, make her design full speed indefinitely regardless of the weather or state of the sea.

The *Skipjack* is capable of operating under the ice. She is capable of steaming at full power for about 90,000 to 100,000 miles.

To give you some idea of what our nuclear submarines are doing, let me give you some figures: the *Sargo* left Mare Island in January and was at sea in the Pacific continuously for 19,000 miles on one cruise. She returned 2 months later having steamed 18,900 miles of that 19,000 miles completely submerged.

Mr. FORD. Would you repeat that?

Admiral RICKOVER. The *Sargo*, on one cruise early this year, cruised 19,000 miles in the Pacific. Of that 19,000 miles, 18,900 were completely submerged.

That is a rather fantastic figure when you compare it with the operations of our diesel powered submarines. These submarines run an average of about 18,000 miles per year, at an average speed of about 10 knots; of the 18,000 miles about 75 percent is on the surface.

The *Sargo* cruise was about 99.5 percent submerged.

Our nuclear submarines are operating submerged about 75 percent of the time. They are designed to make higher speed submerged than on the surface.

They are also cruising at high powers. The average naval vessel in World War II cruised for about 1 percent of her time at full power.

The nuclear ships are cruising at full power a large part of their time; almost 50 percent in fact, their average power underway is about 50 percent of full power.

The *Nautilus*, on her cruise from Honolulu to England last August when she went under the North Pole, steamed over 8,000 miles. She was under the polar ice for 1,830 miles.

The *Skate* about a month ago made a 9,000-mile submerged cruise of which 3,000 miles was under the polar ice.

As you know, 71 percent of the globe's surface, some 140 million square miles of the earth's surface is ocean, and the area of the Arctic Ocean is about twice that of the United States. The atomic submarine is opening up this entire new area for naval warfare.

The *Seawolf* steamed about 13,000 miles while completely submerged for 60 days.

I could go on quoting statistics of that kind.

There is one other significant statistic. The Navy requires a new conventionally powered ship to steam for only 4 hours at full power for acceptance.

Two years ago I ran the land prototype plant for the *Nautilus* for 66 days and 66 nights continuously at full power. This was far more than any propulsion plant—land, sea, and air—had ever run continuously, and a ship with that engine would have gone around the earth twice.

With this introduction, I will now attempt to answer your question.

SOVIET SUBMARINE THREAT

I do not believe we are building enough attack submarines. Today it is the best weapon that we have for destroying enemy submarines. There is no better weapon.

The Russian submarines can come near our coasts. They can fire missiles. If their submarines come off our coast they can drop hydro-

gen or atomic warhead missiles into our cities. One such missile, accurately placed, could destroy a city.

The best way we know to destroy these submarines is by other atomic-powered submarines.

Mr. FLOOD. The Russian is not firing submerged is he?

Admiral RICKOVER. Off the record.

Mr. FLOOD. Our REGULUS type?

Admiral RICKOVER. Off the record.

So far as I know, they do not yet have nuclear-powered submarines.

It is my opinion that their automic-powered icebreaker, from what we know of it, which has three atomic engines, will be a forerunner for submarine propulsion. I am certain they would much rather have built a nuclear submarine than an icebreaker had they been able to.

With the experience they will get from the icebreaker there is no question in my mind that they will soon have atomic-powered submarines, too.

EFFECT OF NUCLEAR POWER ON POLAR REGIONS

We should do everything possible, while we still have time to exploit the lead we have. We can exploit that lead in two ways. It takes time to build up a nuclear power industry. It also takes time to explore the Arctic; we should be doing that a great deal more than we are now. The nuclear submarines have developed thousands of times as much scientific information about the polar ocean depths in the few cruises they have made in the polar area than have ever been developed before. Here is a large area of the earth, an area about twice that of the United States, which should be charted as soon as possible so we can learn where to operate and where to hide out.

What nuclear power has really done for the polar regions is to make another large area of the earth insecure and bring it into warlike focus. It has been immune from war up to now, but any nation that possesses nuclear submarines can now use that area for warlike operations.

U.S. SUBMARINE-BUILDING CAPACITY

We have the capacity right now, with the number of submarine building yards, to build about 10 more nuclear attack submarines a year. Their cost is approximately $50 million each. Of course, if Congress were to decide to build more of these submarines and tack the cost onto the naval shipbuilding program, that would play havoc with the rest of the naval program.

CONSIDERATION OF DEFENSE FROM NATIONAL RATHER THAN SERVICE VIEWPOINT

It has been my opinion for some time that certain elements of our defense should be considered from a national standpoint, whether it is SAC or whether it is certain other new weapons, and not tied specifically to any of the military departments. I believe we have made a mistake in not doing so. Among the Joint Chiefs of Staff there is naturally a tendency to bargain for each to get something for himself. You cannot blame a man who is on the Joint Chiefs of

Staff for remembering the loyalty that he has to his service, and that he inevitably must have if he is to represent his service. I believe some things should be taken out of the realm of the triservice argument—not only submarines. If I were doing it, I would remove certain items from the departmental budgets and call them national objectives rather than Army, Navy, or Air Force objectives.

Mr. FLOOD. It is being suggested that POLARIS, being a strategic bomber arm, should therefore be a part of that service which has jurisdiction over strategic bombardment.

Admiral RICKOVER. I would like to answer that question. I do not believe you should take any weapon, whether POLARIS or any other weapon, from the particular service which is developing it until it is fully developed and proved operationally. At that point I believe it would be wise to assign similar types of weapons to one service.

For instance, I could very well envisage that the service—it could be any one of the three—which operates SAC could also operate POLARIS, because both have the same mission, but I would not do that until they have proved themselves. That applies to missiles, too.

SOVIET NUCLEAR PROPULSION CAPABILITIES

Mr. SIKES. Admiral, would you tell us to what extent you believe the Russians have the know-how to build nuclear ships? You mentioned the icebreaker, but you mentioned it only in passing. I would like you to go into more detail on Russian know-how for the construction of nuclear ships.

Admiral RICKOVER. I can only give you a conjecture based on my personal convictions and intuition. There have been rumors which have ranged all the way from our nuclear submarine effort being decried by Russian military papers—saying we really had more, and so on, to rumors that they are building them. I think they are capable of building them. I do not believe that their "backup" industry is as good as ours. That is, we, being an industrial nation with many years of experience, have built up a backup industry, by which I mean we have large numbers of small manufacturers throughout the country that can specialize on specific items.

Today they may not be quite as capable as we are to build nuclear submarines quite so fast as we can, but I do believe they can build nuclear submarines and that it is only a question of time before they will have a nuclear submarine force.

Mr. FORD. Why did they pick an icebreaker for their first nuclear-powered ship?

Admiral RICKOVER. My opinion is that it is because they could not do it as readily on a submarine. The Russian propaganda is that everything they do is for peaceful purposes, and that we are a warlike nation, whereas everybody in Russia has a dove of peace in his home.

Mr. FLOOD. I would like to ask this, Admiral, as I should have asked earlier: I am concerned about the quality, nature, types, and kinds of testimony we get here because of these directives from the Bureau of the Budget, which is one of my pet hates. I just wonder under how many wraps you are appearing under this morning. Are you handcuffed?

Admiral RICKOVER. No, sir.

Mr. FLOOD. Have you been briefed?

Admiral RICKOVER. I have not read that directive; consequently, I do not know what instructions there are in it.

Mr. FLOOD. Ignorantia legis neminem excusat.

Admiral RICKOVER. Does that answer you, sir?

Mr. FLOOD. I was sure of that. I just wondered whether you would say so.

Admiral RICKOVER. I have never followed any directive in testifying to Congress. Once one of my seniors called me before I was due to testify and told me what his policy was. I said, "Fine. Thank you very much. When I testify I will say that this is what you told me to say." He said, "Oh, no; you mustn't do that." I said, "Didn't you tell me?" Since that time I have never been directed.

Mr. FLOOD. That applies to this morning?

Admiral RICKOVER. Yes, sir. If you want to put me under oath, sir, I will state this under oath.

Mr. FLOOD. No, no. I know. I just want to hear you say so.

Mr. SIKES. Would you foresee there is any possibility that we will lose to the Russians our present leadership in the manufacture of nuclear ships?

Admiral RICKOVER. We can in a relatively short period of time. As you know, the Russians have a tremendous capacity for manufacturing submarines. I am sure this has been brought out time and again before your committee. I believe a figure of 100 submarines as their yearly submarine-building capacity has been given you. Once they build the first one, they can build them very fast. In fact, it is quite possible if the Russians made up their mind to build nuclear submarines on a large scale they could soon outstrip us. They may be doing this now because it is known, as has been testified to your committee, that they have given up manufacturing the types of submarines they presently have. That could be for one of two reasons: either they are preparing to build a new nuclear type or they figure they have enough of the present ones to do the specific job for which they have planned their submarine fleet. I believe that they do not consider the primary job of their submarines is to destroy commerce so much as it is to prevent our reinforcements reaching Western Europe and to fire missiles into our cities. I am sure they have learned the lessons that the Germans did not learn in two wars. If they are going to engage in an all-out war, they must first defeat the United States or at least make us militarily impotent; that there is no use in their merely winning a victory in Europe because that would simply be a prelude to what they have to do later on.

NEED FOR ADDITIONAL NUCLEAR ATTACK SUBMARINES

Mr. SIKES. How would you say we can best utilize our effectiveness in nuclear-powered ships and submarines for national defense?

Admiral RICKOVER. I would build about 10 more attack submarines a year. That is a practicable figure. The cost is not prohibitive. The nuclear part of one of these ships only costs about $12 million. There appears to be a tendency for people to say that it is the nuclear part that makes these ships expensive. Actually they are not so expensive.

Mr. FORD. I think it would be most helpful for the committee to have the figures for an aircraft carrier, because I and I suspect others believe if we are to have another attack carrier in the budget for 1960, we should have nuclear power in it. Would you mind developing your views on that?

Admiral RICKOVER. Of course. I read some of the questions that, at various times, members of this committee have asked the witnesses, from Secretary McElroy on down, "Why didn't you put in for a nuclear-powered carrier?" I believe testimony was developed before this committee that originally the nuclear carrier had been asked for. Well, the Bureau of the Budget says, "This is the amount of money you can have, and you have to operate within that amount." You know that as well as I do. This is the essence of the matter. The Bureau of the Budget says: "you can have X dollars." The Navy wants very much to have a carrier. I do not think it necessary for me to go into the reasons. They have been very well developed over many years before your committee. By carrying out the minimum additional shipbuilding requirements which the Navy has and by dint of making many sacrifices, the Navy will get a conventionally powered carrier, but they cannot get a nuclear carrier because they would have to sacrifice other essential items.

What do you actually save? For the first nuclear carrier the additional cost over an equivalent conventionally powered carrier has been stated to be about $120 million. But you must bear in mind that this figure includes the cost of the nuclear cores. These cores cost more than ——— and they contain the nuclear fuel which will be used to propel that ship. Of course, the nuclear fuel is much higher in cost than oil, but I think we get ourselves confused too much in making these cost comparisons. There was an editorial in the Washington Star day before yesterday, I believe, in which General LeMay was quoted as saying that the B–52, our newest bomber, requires six times the amount of maintenance that the World War II B–17 required. But the B–17 cannot do today's job. So the comparison becomes meaningless. If you compare the increased costs for nuclear ships with the increase for other new weapons, I think you will find they are quite a bargain from that standpoint. They are much more expensive, of course, but there is not this big increase comparatively that you get for other new weapons.

Take the *Skipjack*. Mr. Mahon is quite familiar with it, because he has been on board. That type can be built for $50 million. Look what you get for that $50 million. You get a small task force in itself. The Navy has its large task forces. You have a carrier, and you have a protecting screen. You need lots of people and lots of ships to protect it. The nuclear-powered submarine actually constitutes a small task force all by itself, for instead of having guns for its protection, instead of having other escort vessels, the ocean is its protector.

Mr. FLOOD. And POLARIS?

Admiral RICKOVER. That is true of any nuclear submarine, whether it is POLARIS or an attack submarine. It carries a small number of men—about 100 to 130, depending on the type. It needs no armor. It stays at sea indefinitely. It needs no supporting forces. It needs

no tankers. It is a task force by itself. It can hide out under the ice and cannot be discovered. What more do you want?

Mr. FORD. Have you ever made a comparative analysis of the annual operating costs of the attack carrier (1) with conventional power and (2) with nuclear power?

Admiral RICKOVER. There has been such an analysis made, and of course it shows that the nuclear carrier is more expensive to operate. That is quite correct. It is more expensive.

Mr. FORD. Is that true?

Admiral RICKOVER. Yes, sir, inevitably, because the fuel cost will be greater. I think the cost of the fuel will be seven or eight times as great. But the Navy expenditure for fuel per year is about 1 percent of the total naval appropriation. So what if you go up to 2 percent?

Think of the military value you get in the lack of tankers and the lack of other logistic support. The nuclear carrier holds almost twice as much jet fuel, which is today the limiting feature in a carrier operation. They can operate only ——— days at full blast with jet planes. If you double that, it means you have the equivalent of twice as many carriers at the firing point.

Mr. FORD. In other words, you are saying: If you add in the supporting costs, this other disadvantage evaporates.

Admiral RICKOVER. Mr. Ford, you know darned well that to buy an obsolescent ship is stupid. You know that. I am sure every member on this committee knows that. I do not care what arguments are given to you. What is the purpose of buying a ship—what is the purpose of having any weapon of war that is not the best? Whom are you fooling?

Mr. MAHON. Will you yield?

Mr. FORD. Surely.

Mr. MAHON. It is said we might not get the second atomic carrier quickly enough, and in order to have a ship ready for the fleet we have to buy the conventional carrier.

Admiral RICKOVER. I question that very much, sir. Atomic power has been blamed for many things. Take submarines, for example. The record shows we are building them faster than the Navy is building conventional ships. I think that the same thing will prove true of the nuclear carrier that we are now building.

Mr. MAHON. Specifically, on the point that we have to have the conventional carrier because, among other things, we must have it on time for operation with the fleet and the second atomic carrier might not be ready. What is your view on that?

Admiral RICKOVER. I do not wholeheartedly subscribe to that viewpoint. We are buying everything for the nuclear plants, not only for the submarines but for the carrier, from three different sources of supply on a 100-percent lump-sum competitive basis. We have built up these sources of supply, by the way, 100 percent owned by industry. We have this capacity. This is one of the things which has not been remarked about much that I have done in the last 5 years. I have three sources of competitive supply for everything I use.

Mr. MAHON. To order a conventional carrier now would be ordering an obsolescent ship, in your opinion?

Admiral RICKOVER. Certainly. I think it is just as much obsolescent as if you bought diesel submarines today.

You asked me at the beginning of this testimony whether I was talking for the Navy or talking for myself. I am talking for myself, sir.

Mr. ANDREWS. Will the gentleman yield.

Mr. FORD. Surely.

COST OF NUCLEAR AND CONVENTIONAL POWERED CARRIERS COMPARED

Mr. ANDREWS. The life of a conventional-type carrier would be about the same?

Admiral RICKOVER. There is no difference, sir. Twenty years is considered the standard life of a major warship.

Mr. ANDREWS. The nuclear carrier would cost approximately $120 million more than the conventional; is that right?

Admiral RICKOVER. Yes, sir. I stated previously that about ——— of that was the cost of the nuclear cores, the fuel. You cannot just knock off that from the cost. I want to make that clear. It is more expensive to build and operate it, but you have to pay something for having a ship which does more. If you knocked off the cost of that fuel, you would get down to only ——— more for the carrier which is presently being built.

I am trying to answer your question, Mr. Andrews. I have to lead into it this way. What I am getting at is that the present one is really only ——— more instead of $120 million more—if you knock off the fuel cost. The Bureau of Ships made a design study for a nuclear carrier unit with four reactors instead of the eight reactors which the present one has. With four reactors we would get a ship whose maximum speed would be about 2.5 knots less, but have all the other characteristics, and we would save about ——— this way.

Mr. ANDREWS. My question is this, Admiral: Over the 20-year period which you say is the expected life of each one of the carriers, would the conventional type be cheaper than the atomic-powered type?

Admiral RICKOVER. Yes. It is cheaper to travel from Chicago to New York by a horse and buggy too. Yes, it is cheaper.

Mr. ANDREWS. Once you put the cores in, you do not have to buy the fuel, do you?

Admiral RICKOVER. Once you put the cores in, they should last that ship about 5 years; that is, for a 5-year period you would be free of logistic support for propulsion fuel, and you could also carry nearly twice as much aviation fuel.

Mr. ANDREWS. I do not think you have answered my question. Over that 20-year period——

Admiral RICKOVER. The nuclear carrier will cost more. I see what you are getting at now. If you took all these other aspects into account, the building of tankers, the oil storage facilities, and so on, and the reduction in supporting personnel, it might not cost any more, even discounting the additional military advantages you get.

Also, the fuel costs for a nuclear ship will drop as core life increases. For this reason, the development of long-lived cores is a major objective of our program. I believe that through increase in the life of nuclear cores, the nuclear fuel cost will be reduced.

Mr. ANDREWS. That answers my question. In other words, you have a cheaper operating cost for your nuclear-powered ship over

that 20-year period than you would have with the conventional type, bearing in mind that you have to have tankers and other support for the conventional carrier.

Admiral RICKOVER. It is possible. You have to build shipyards. There are a lot of things. You have to have more steelmaking capacity. This is particularly undesirable if you are going to build it in wartime, because you would like to place a minimum drain on your industrial potential. One of the advantages you get from nuclear power is that you can store fuel cheaply and easily. It is not radioactive. One or two large warehouses could store all of the nuclear fuel you would use during an entire war. So you do not have to worry about building many oil tanks, tankers, the ships to convoy the tankers, the steelmaking capacity, and the other things that go with them. That is, you can conserve labor. You save up labor in peace and it is available in war. The thing which determines what you can do in wartime is how much labor you can marshal in your production lines. We learned that during the last war.

SAVINGS POSSIBLE IN BUILDING SLOWER CARRIER

Mr. SIKES. You mentioned that by taking a 2½-knot reduction in maximum speed we would eliminate a considerable sum in costs.

Admiral RICKOVER. Yes, sir.

Mr. SIKES. That is the first time I have heard that statement, and it is a very interesting one. What would be the resulting characteristics, what kind of carrier would you have, how effective would it be, and what is the Navy's attitude toward a carrier with about 2½ knots less for ——— less money?

Admiral RICKOVER. This carrier, aside from having a maximum speed of 2½ knots less, will have exactly the same characteristics as the one they are asking for. Whether the operating people can tolerate this 2½-knot reduction in maximum speed is a question which you should ask them. I personally would like to have some of them.

Mr. SIKES. You do not consider it would be obsolescent in the sense that a conventional carrier might be?

Admiral RICKOVER. Again, sir, you are getting into a strict operational characteristic, and I would rather you asked the operational people. I can give you the facts on propulsion plant costs.

Mr. SIKES. Would it have as much speed as the one the Navy now plans to build?

Admiral RICKOVER. It would be about 2½ knots less.

Mr. SIKES. Than the one now programed, the conventionally powered one?

Admiral RICKOVER. Yes, sir.

Mr. WHITTEN. Would the gentleman yield?

Mr. SIKES. Yes.

NEED FOR FEWER NUCLEAR-POWERED SHIPS THAN CONVENTIONAL

Mr. WHITTEN. These comparisons, I realize, are a little unfair, Admiral. After all, the purpose of having either ship is for defense or for use in time of war. Would there be any way to compare the relative cost of nuclear-powered carriers and tie that back to some of the naval engagements we have had in the past? In other words,

for the exact same engagement, how many nuclear-fueled ships could we have had and still done the job?

Admiral RICKOVER. I will try to answer that question, but my answer will necessarily have to be rather vague.

Mr. WHITTEN. I can realize that.

Admiral RICKOVER. The Navy made a study several years ago about the impact of nuclear submarines in the Atlantic. It was estimated at that time that about ——— nuclear-powered submarines could stop all shipping on the Atlantic. I can visualize if we had about ——— nuclear submarines in the Pacific they would have done two or three times as much damage as all our submarines did. That is getting back to what you could have done if you faced knights in armor with bullets. You get into that sort of argument.

Mr. WHITTEN. Yes, but I was trying to develop that; to compare the cost of one ship with another ship gives an unfair comparison. You can get along with fewer nuclear-powered ships.

Admiral RICKOVER. There is no question that, from the point of view of its effectiveness as a military weapon, it is superior on a cost basis. Atomic weapons on a cost basis are all much more effective than any conventional weapons are. There is no question about that.

Mr. WHITTEN. But if you match their destructive capacity against an equal amount of destructive capacity of the other type, they become much cheaper. I was trying to apply that to the nuclear carrier: how much normal-type operation it would take to equal it.

Admiral RICKOVER. The normal carrier can operate at full power continuously for about ——— miles. The nuclear carrier will operate about ——— miles at full power continuously. Of course, that is the question Mr. Ford and Mr. Sikes were asking about the fuel cost.

COST OF NUCLEAR AND CONVENTIONAL CARRIER COMPARED

Mr. FLOOD. I lost Mr. Ford's answer. I heard the figure ——— million. I lost that series of figures.

Admiral RICKOVER. Let me repeat them.

Mr. FLOOD. What were you trying to prove?

Admiral RICKOVER. Let me repeat those figures. The cost of the present nuclear carrier is quoted as being $120 million more than an equivalent conventionally powered carrier. In that $120 million there is included about ——— million for the cost of the nuclear cores. If you knock that off, you get down to a difference of ——— million. If, in addition, instead of using eight cores, which I am using in the present carrier, I use only four improved-type cores—we have made a lot of developments since we started building the first carrier—I can save more. So even including the cost of the fuel, there would be ——— million differential instead of $120 million differential. If you knocked off the cost of the fuel on the four-reactor carrier, then you have a ——— million differential in the cost.

COST OF NUCLEAR CARRIER 2½ KNOTS SLOWER

Mr. SIKES. Let me be sure of the statement which you gave us a few minutes ago. I understood you to say if we cut back on the speed about 2½ knots we save about ——— million, but is that cutting 2½

knots below the speed of the conventional-powered carrier which is now proposed?

Admiral RICKOVER. Yes, sir; that is correct. All carriers, nuclear and otherwise, which are being built generally have about the same speed, within close limits. With the new four-core carrier there would be a 2½-knot reduction in speed.

Mr. SIKES. Would that mean it could not keep up with the task force.

Admiral RICKOVER. But the task force is supposed to keep up with the carrier.

Mr. SIKES. Do you foresee any major problems in connection with having a 2½-knot differential?

Admiral RICKOVER. This, sir, is a question which you should properly ask the operating people. I am not competent to answer that.

(Discussion off the record.)

Mr. SIKES. Did you get an answer, Mr. Whitten?

Mr. WHITTEN. Yes.

Admiral RICKOVER. Your question is hard to answer.

VALUE OF NUCLEAR AND CONVENTIONAL SHIPS COMPARED

Mr. WHITTEN. I know it is. Not that you need any help, Admiral, but I was pointing out a comparison of one ship with another ship might leave unanswered the fact that one ship might be worth three of another kind. So the true comparison would be a nuclear ship as against the same capacity figured in normal ships.

Admiral RICKOVER. Let me answer that. I believe that logistic support is going to be an increasingly difficult problem for the Army, Navy, and Air Force from now on. Anything you can do to be self-contained logistically will be a tremendous help to you from now on because the logistic support requires arrangements with neutral countries. You are not sure it will be available when you really need it. The whole thing could be a house of cards. Anything we can do to maintain logistic support under U.S. sovereignty is a tremendous help, the way the international situation is developing.

I don't think that you can determine before you build a nuclear ship that it is worth this or that number of conventional ships. Years ago, before the *Nautilus* was built, the Navy tried to compare nuclear submarines with conventional ones, but they just couldn't imagine all the advantages of a nuclear submarine before it was actually tried out. None of us could. But it turned out that the *Nautilus* is really a new weapon that makes conventional submarines obsolete.

I think we'll probably find much the same situation with nuclear surface ships. There are the facts we have to consider:

1. World oil supplies are dwindling and a continual increase in the price of oil is certain.

2. The availability of oil from one of our principal sources, the Middle East, is increasingly uncertain.

3. The ability of our surface forces to perform their deterrent function and to wage limited war is highly dependent on the uncertainty of their location. This uncertainty is directly related to their endurance at sustained high speed. Nuclear ships have unlimited capability for this; conventional ships do not.

4. The ability of our surface forces to evade submarine action, particularly by nuclear submarines, is also highly dependent on sustained speed. The vulnerability of surface ships while refueling is particularly important in this regard.

5. The ability of our surface forces to wage antisubmarine warfare against nuclear submarines is likewise highly dependent on their ability to stick to the target indefinitely. Conventional ships can't do this.

NUCLEAR-POWERED AIRCRAFT

Mr. FLOOD. Admiral, I want to get away from the carrier for a minute. When the Air Force people were here, research and development and aircraft procurement, nearly all of the members of the committee, certainly three or four, were harping on nuclear aircraft. For 10 years we have been talking about that. We are satisfied we are getting no place. So I said to these Air Force people, "I am pretty well fed up with the way you are going about this thing. Suppose I get hold of Rickover and send him over to you, what would you do about it?" First of all, they said they would be glad to have you.

Admiral RICKOVER. That would be a dire fate, sir.

Mr. FLOOD. Now that you are here, what about this nuclear-powered aircraft? I asked them, "What has propulsion to do with the airframe?" They said the chief problem is propulsion. You are the propulsion man, so why don't you go over and build them a nuclear airplane?

Admiral RICKOVER. First, you would not want me to upset all those Air Force people, would you?

Mr. FLOOD. Yes, sure.

Mr. FORD. You have had your own troubles.

Mr. FLOOD. You certainly cannot upset them any more than you have the Navy, so what difference does it make?

Admiral RICKOVER. The Air Force is a bigger organization. They have more industrial organizations. They have more factories which the Government pays for, more lobbyists.

Mr. FLOOD. Scratch the Air Force. Go and build it for the Navy.

Admiral RICKOVER. That is being worked on now, sir.

Mr. FLOOD. By you?

Admiral RICKOVER. No, sir.

Mr. FLOOD. I am talking about you. What do you think about it? You think about everything else.

Admiral RICKOVER. What do you think about running for Congressman from two districts?

Mr. FLOOD. I want to take you out of one. Are you interested in that?

Admiral RICKOVER. No, sir.

Mr. FLOOD. Is it practical? Is it good? What do you think about it? You are the nuclear man.

Admiral RICKOVER. I have enough troubles of my own, sir.

Mr. FLOOD. I know that.

You are going "chicken" on me.

Admiral RICKOVER. No, I am not going "chicken" on you. What would you want me to do? Would you get up and make speeches about your conferees in Congress from your State?

Mr. FLOOD. I don't know anything about this nuclear aircraft. Mr. Boyle and one or two others asked me particularly about it. We are always talking about nuclear aircraft. It is a practical thing? Should we have it? I do not know.

Admiral RICKOVER. You gentlemen here are the experts in the United States on these matters.

Mr. FLOOD. I admit that, but now I want to share some of it.

Mr. SIKES. Please, just a moment. Obviously the Admiral does not feel he wants to get into that discussion. We have a number of pertinent questions to ask him.

STATUS OF SHIPPINGPORT ATOMIC POWERPLANT

Admiral, what is the status of your Shippingport central station atomic powerplant?

Admiral RICKOVER. That station was authorized by Congress in 1953 because there was no full-scale nuclear powerplant underway in the United States. I said at the time I could have it in operation in 1957. We did. We had it running in December 1957. It was designed for 60,000 kilowatts of net electrical power. It is running at full power right now. I am not so sure when you get home that some of your electricity does not come from that station, Mr. Flood. It has delivered close to 300 million kilowatt-hours of electrical power since it started.

Mr. FLOOD. Don't say that. Mine is a coal district.

Admiral RICKOVER. By using atomic power, as I told you last year, we are conserving coal and your district will last longer.

Mr. FLOOD. I can't give it away now.

Admiral RICKOVER. We are designing a new nuclear core for the Shippingport plant which should generate about 150,000 kilowatts of electrical power instead of the present 60,000. We will need money from Congress to do that. We will need a total of about $20 million; $5 million of that will go for modifications to the nuclear part of the plant, and $15 million to put in more generating capacity.

Mr. SIKES. What is the comparative cost of power generated by nuclear means and power generated by conventional means? Have you any figures on that?

Admiral RICKOVER. The cost of nuclear power is much higher today. It is higher for those plants which are operating. It is low for all plants which have not been built.

Mr. SIKES. I do not understand.

Admiral RICKOVER. All plants for which people come in here and ask for appropriations are always cheap, easy to build, and have no problems. The only problem is to get a pad of paper, 8 by 10½ inches on which to do the figuring. But when you start building them they become more expensive, they become more difficult, and the power costs more.

Mr. SIKES. Have you any comparative kilowatt-hour costs?

Admiral RICKOVER. You mean what it is costing us?

Mr. SIKES. Yes.

Admiral RICKOVER. Yes, sir; we have that. It is costing us about eight or nine times as much as conventional power. But we are using the plant as an experimental facility. We are not operating it solely

to generate electricity. It is thoroughly instrumented and we are learning many lessons. The lessons we are learning in that plant are being used by all other designers in the United States and all over the world. So you must consider it as a laboratory facility.

Mr. SIKES. What do you project as the future cost, say, in 5 years, in industrial operation?

Admiral RICKOVER. I will now give you some more undirected testimony. I stated in 1946 that for a period of 10 years thereafter nuclear power would not be competitive, even if the Government gave the fissionable material for free. I stated in 1956 that for the next 10 years the same would apply. I state now, in 1959, that for the next 10 years nuclear power will not be competitive with fossil fuels, coal or oil. You will be given lots of figures by many people, as you have been given for many years, that nuclear power soon will be competitive, but I do not see it, not for a long time.

SUPPORT OF NUCLEAR POWER PROGRAMS

Mr. SIKES. Are you being given maximum support in your work? I am speaking of the broad program of the development of nuclear propelled naval vessels and the development of the central station nuclear powerplants.

Admiral RICKOVER. I am being given maximum support by Congress particularly. You may get a request for appropriations for two items in my program. One is for the Shippingport reactor. Instead of spending money for a complete new nuclear plant complex which might run $100 million to $120 million, I can for a total of about $20 million increase the capacity of the Shippingport plant 2½ times. That is one item which may come up to your committee. That is presently being considered for authorization by the Joint Congressional Committee on Atomic Energy.

Another item is a natural circulation reactor plant for a submarine. That would be a considerable improvement over any submarine reactor plant we have now. It would eliminate the main coolant pumps. It would eliminate the big check valves and simplify the piping and electrical systems. It would make the ship more reliable. I have adequate research and development money for that purpose. But I need an $18.5-million authorization to construct a land prototype to try it out. Of this $18.5 million, I need, for the fiscal year you are considering, $6 million authorization and $2 million to spend. These two items may need your support.

But I would like to say here and now that I have always been treated well by all committees of Congress. I have no complaint. I have no complaint about the amount of money I am getting. I have never asked for more money than I need. At the same time, I do not waste money. If something is not right, I cut it off.

You can get the job done much faster if you do it efficiently. Really, even if the saving of money was not a consideration, you will do the job faster if you do not waste money. Wherever you waste money it takes longer to get the job done. I can tell you this from considerable experience.

NATURAL CIRCULATION REACTOR PLANT FOR SUBMARINES

Mr. MAHON. Admiral, I did not quite get the next step in perfecting the atomic submarine, this new type you are working on.

Admiral RICKOVER. You went through the *Skipjack* when you were in New London?

Mr. MAHON. Yes.

Admiral RICKOVER. As you looked down into the reactor compartment, you noticed there were lots of valves and pumps. We can eliminate a lot of that, which means a considerable reduction in maintenance and in difficulties. This is particularly desirable for ships that operate under the ice. The Secretary of Defense has asked the AEC for this. A request for appropriations may be coming to your committee.

Mr. MAHON. How long would it take you to develop that sort of submarine? When might it become operational?

Admiral RICKOVER. I could have the prototype finished and operating in about 2½ years if I get authority to go ahead right now.

Mr. MAHON. If this works as you think it would, that would be the powerplant type for the future?

Admiral RICKOVER. Yes, sir. You see, if we build seven or eight submarines a year, every year I delay I am turning out seven or eight ships which are not as good as they could be.

SUPPORT FROM NAVY

Mr. SIKES. Are you getting all the support you need from the Navy? You said you were getting maximum support particularly from Congress.

Admiral RICKOVER. I am getting adequate financial support from the Navy. As you know, there is a tendency in the Navy to keep me from getting involved in various parts of the submarine. It is probably quite natural, but I believe if people in the Navy could forget personality, they might make better use of me.

Mr. SIKES. Mr. Riley, you had a question.

NEW CORE FOR SHIPPINGPORT PLANT

Mr. RILEY. Admiral, when you put this new core into your Shippingport plant to produce 150,000 kilowatts instead of 60,000, will that reduce the cost per kilowatt proportionately?

Admiral RICKOVER. Yes, because the cost of a core is mostly the fabrication cost and we think we can keep that about the same. Yes, sir, it will be a very significant step in the direction of approaching competitive atomic power. It will still not be competitive, and I do not want to leave that impression with this committee. As I said, I do not know of anyone who is realistic, who knows what he is talking about, and who comes to you not with the sole idea of getting appropriations but also to tell you the facts, who will claim that a nuclear plant is competitive.

Mr. SIKES. Admiral, if we should find ourselves, in addition to facing an overwhelming number of conventional Russian submarines, also confronted with a rapidly growing number of nuclear Russian submarines, what would be your recommendation about the proper procedure for coping with such a situation?

Admiral RICKOVER. The only concrete suggestion I can give you now short of finding some easy way to kill nuclear-powered submarines, which we do not know, is to have more nuclear-powered submarines. I do not know any other way. Today the nuclear-powered submarine is the best weapon there is for killing any kind of submarine.

Mr. MAHON. Admiral, if we should have a war of considerable duration, my greatest fear in some ways is the threat of the enemy submarine. I fear we have not made the progress we should have in antisubmarine warfare, and I think we ought to do more than we are doing in order to try to find a better answer to this problem of antisubmarine warfare.

I realize we could have a war which was an all-out atomic exchange which perhaps would devastate much of the world in a short time. If we have a war which lasts a considerable length of time and we have to keep the channels of shipping open, I am very much worried about our ability to do that in view of the threat of the submarine capability of the opponent.

I would like your general comments on that overall problem.

Admiral RICKOVER. I believe you asked this question in previous testimony as to whether we could categorically state we ever caused a Russian submarine to surface.

(Discussion off the record.)

Admiral RICKOVER. That highlights the point you are making.

I agree with you. I have been in the Navy since shortly after the First World War. I was in submarines between the two wars. I remember the statements then being made that we were overcoming the submarine menace. Looking back, it is plain that we were almost dormant in that effort. We did not make much progress between the two wars, and we nearly lost the last war because of that.

My opinion is that relatively, we are no better off today than we were before 1941. That is, we are in no better position to defeat today's Russian submarine menace than we were to defeat the German submarine threat in 1941. If fortune favors us and we have the privelege of looking back from the vantage point of 10 to 15 years from now, we probably will find that relative to today's requirements we are doing no better than we did between the two World Wars—that we have not learned the lesson.

Mr. MAHON. Why do we not do better?

Admiral RICKOVER. May I talk off the record?

Mr. MAHON. Off the record.

(Off the record.)

Mr. MAHON. This has been a most interesting discussion.

The language in the bill, which is most important and some of which will be highly controversial, will be the subject of the hearing this afternoon.

The committee will stand adjourned until 2 o'clock.

WEDNESDAY, APRIL 22, 1959.

EMERGENCY FUND—DEPARTMENT OF DEFENSE

WITNESSES

C. S. LIVERMORE, CHIEF, R. AND D. BRANCH, BUDGET DIVISION, ASSISTANT SECRETARY OF DEFENSE (COMPTROLLER)

MAJ. GEN. ROBERT S. MOORE, SPECIAL ASSISTANT TO THE ASSISTANT SECRETARY OF DEFENSE (COMPTROLLER)

Mr. SHEPPARD. General Moore, the other day the chairman of the committee, Mr. Mahon, requested that you prepare two statements, one for the committee and one for the record, having to do with the emergency fund which was dealt with quite extensively when Mr. McNeil, the Comptroller, was here.

Do you have the statements?

General MOORE. Yes.

(The statements referred to follow:)

(Additional detailed information was also furnished to the committee staff.)

OFFICE OF THE SECRETARY OF DEFENSE EMERGENCY FUND, DEPARTMENT OF DEFENSE

Program and financing

	Actual, 1958	Estimate, 1959	Estimate, 1960
Program by activities: Research and development contingencies (reserve for transfer)		$102,749,750	$150,000,000
Financing: New obligational authority		102,749,750	150,000,000
New obligational authority:			
Appropriation	$85,000,000	150,000,000	150,000,000
Transferred (71 Stat. 313; 72 Stat. 7, 243, 713) to—			
"Salaries and expenses, Secretary of Defense"	−1,000,000	−751,000	
"Salaries and expenses, Advanced Research Projects Agency"	−73,100,000	−20,000,000	
"Research, development, test and evaluation, Army"	−82,111,000	−15,394,000	
"Research, development, test and evaluation, Navy"	−47,813,800	−3,905,250	
"Research, development, test and evaluation, Air Force"	−29,435,000	−25,700,000	
Transferre 1 (71 Stat. 313; 72 Stat. 7) from—			
"Operation and maintenance, Army"	61,046,800		
"Reserve personnel, Navy"	2,732,000		
"Navy personnel, general expenses"	700,000		
"Military personnel, Marine Corps"	13,551,000		
"Aircraft and facilities, Navy"	11,900,000		
"Ships and facilities, Navy"	900,000		
"Civil engineering, Navy"	3,630,000		
"Servicewide operations, Navy"	2,600,000		
"Aircraft, missiles, and related procurement, Air Force"	33,000,000		
"Operation and maintenance, Air Force"	18,400,000		
"Procurement other than aircraft and missiles, Air Force"		18,500,000	
Appropriation (adjusted)		102,749,750	150,000,000

General MOORE. This appropriation request for $150 million is essentially for research, development, test and evaluation. In the course of the continuing efforts of the Department of Defense to increase knowledge in science and to apply such knowledge to the development and initial procurement of improved weapons and military equipment, it is not always possible to predict completely the

exact course of the investigations undertaken. Many times work in progress will demonstrate areas of effort which warrant the allocation of resources in addition to, or earlier than, those previously planned.

These situations can occur in any part of the research, development, test and evaluation program and at any time during the current year. Under current conditions, it is essential that the Department of Defense have the flexibility to exploit new scientific, development, test, and initial procurement opportunities. While we cannot predict precisely these unexpected needs, we can expect profitable opportunities to arise in such fields as ballistic missile development; antisubmarine warfare; defense against ballistic missiles, including detection and warning; satellites; other space programs; computer techniques; advanced scientific instruments of a major nature; material and component development; and so forth, as well as in the important area of basic research.

Because of the very nature of research and development, progress in individual projects cannot be forecast with any great degree of certainty. From time to time, an unexpected breakthrough is achieved or an entirely new and unanticipated requirement arises. These technological breakthroughs can be of tremendous importance and, in the interest of national defense, should be exploited promptly.

The service research and development programs are reviewed and balanced each year in an effort to assure that the funds provided cover those projects considered to be of highest priority. New requirements can only be satisfied at the expense of existing projects, and it is not always possible to find projects which can prudently be eliminated or reduced without disrupting existing programs.

The emergency fund has been employed in recent years in order to make possible the prompt exploitation of sudden technological breakthroughs, while at the same time avoiding the disruption of the current research and development programs. This fund is financed by direct appropriations to the Secretary of Defense, and, in addition, since fiscal year 1956, there has been authority to transfer from other available Defense Department appropriations. It provides the Department of Defense with the needed flexibility to exploit promptly unexpected technological breakthroughs or to handle late developments, regardless of the military department in which they occur. By providing the fund flexibility in a single place, subject to the direct control of the Secretary of Defense, it is possible to provide far greater flexibility than would be the case if the individual research and development appropriations of the military departments were increased by the same amount.

The emergency fund has been used to initiate such important developments as the Army's JUPITER program, the Navy's POLARIS program, the EXPLORER satellite program; to assist in the Air Force support of the X–15 program; to accelerate basic research, materials research and investigations involving electron tubes and parts; as well as to provide additional support required for the nuclear test program.

In the current fiscal year, the emergency fund has been used to support items such as tests conducted under the direction of the Weapons System Evaluation Group and to increase effort on projects assigned to the Advanced Research Projects Agency, including the MIDAS Infrared satellite program and the DISCOVERER program.

For fiscal year 1960 the Department of Defense requests $150 million for research, development, test and evaluation or procurement or production related thereto, plus the authority to transfer up to $150 million from other appropriations available to the Department of Defense for obligation during fiscal year 1960. This is the same as the amount provided by the Congress for this purpose in the current fiscal year. The current status of this fund is as follows:

Summary of fiscal year 1959 emergency fund transfers as of Apr. 21, 1959

I. Availability:	
Appropriation	$150, 000, 000
Transferred in	18, 500, 000
Total	168, 500, 000
Transferred out	65, 750, 250
Balance available	102, 749, 750
II. Details of transfers in: Air Force	18, 500, 000
III. Details of transfers out:	
Army	15, 394, 000
Navy	3, 905, 250
Air Force	25, 700, 000
OSD	20, 751, 000
IV. Pending approval in the Bureau of the Budget	12, 000, 000
V. Pending secretarial approval in OSD	4, 000, 000

MONDAY, APRIL 27, 1959.

GENERAL PROVISIONS AND LANGUAGE CHANGES

WITNESSES

MAJ. GEN. ROBERT S. MOORE, SPECIAL ASSISTANT TO THE ASSISTANT SECRETARY OF DEFENSE (COMPTROLLER)
M. H. LANMAN, ASSISTANT GENERAL COUNSEL (FISCAL MATTERS), OFFICE OF THE GENERAL COUNSEL
PRENTICE N. DEAN, ASSISTANT CHIEF, FOREIGN ECONOMICS POLICY DIVISION, OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE (INTERNATIONAL SECURITY AFFAIRS)
MAJ. GEN. DAVID W. TRAUB, DIRECTOR OF ARMY BUDGET
ROBERT L. TRACY, COUNSEL TO THE ARMY COMPTROLLER
REAR ADM. LOT ENSEY, ASSISTANT COMPTROLLER
LAWRENCE E. CHERMAK, COUNSEL TO THE NAVY COMPTROLLER
BRIG. GEN. R. J. FRIEDMAN, DIRECTOR OF BUDGET, AIR FORCE
ARTHUR D. HOLZMAN, ASSISTANT GENERAL COUNSEL (FM)

Mr. MAHON. The committee will come to order. A special presentation is planned with respect to the so-called Buy American provisions of the bill. Some of the members were delayed and will be here shortly. They are interested particularly in that portion of the presentation.

Let us proceed with some of the other items and go into the "Buy American" program later.

General MOORE. I suggest that Mr. Lanman proceed in the order that appears in the bill.

Mr. MAHON. You may proceed.

Hire of Experts and Consultants

Mr. Lanman. The first change in language in the general provisions appears at page 178 of the committee print in section 601. The section relates to the hire of experts and consultants. The recommended change is to delete the phrase "but at rates for individual not in excess of $50 per day." This change would permit the payment of a per diem equivalent, in accordance with the permanent basic law, of the top of the Grade GS–15. This amount would be $56.56 as opposed to the $50 now specified in the act.

Mr. Weaver. Is not that establishing a precedent that has not been evident in any other per diem?

Mr. Lanman. Insofar as the Department of Defense is concerned, we have had the $50 rate for a long time. Other departments have $75 and some as much as $100.

Mr. Weaver. Which ones are those? Who has $75 and who has $100?

Mr. Lanman. I believe the ICA in certain of its activities has $75 and the Atomic Energy Commission has $100.

(The following statement was submitted:)

Other Agencies Who Have Authority To Pay in Excess of $50 Per Day

NO MAXIMUM RATE

Executive Office of the President (Public Law 85–468) (the White House).

$100 MAXIMUM RATE

Agricultural Marketing Service, Department of Agriculture (Public Law 85–459)
Bureau of Public Roads, Department of Commerce (Public Law 85–469) (limited to expenditures of $10,000 for services in excess of $50 per day).
The Panama Canal, Department of Commerce Appropriations Act (Public Law 85–469).
District of Columbia, Department of General Administration (Public Law 85–594).
District of Columbia, Washington Aqueduct (Public Law 85–594).
Army, St. Lawrence River Joint Board of Engineers (Public Law 85–863).
Army, Chief of Engineers, River and Harbor Improvements Appropriations, St. Lawrence Seaway Development Corp. (Public Law 85–469) (limited to expenditures of $5,000 for services in excess of $50 per day).
Federal Aviation Agency (Public Law 85–726).
National Aeronautics and Space Administration (Public Law 85–568).

$75 MAXIMUM RATE

Interior, general provisions (Public Law 85–429).
Bureau of Budget, expenses of management and improvement (Public Law 578, June 13, 1956) (to remain available until expended).
Mutual Security Act (Public Law 665, 83d Cong.).
General Services Administration, transportation and public utilities service (Public Law 85–844).
Interior, Office of Mineral Exploration (Public Law 85–766).
Justice, general provisions (Public Law 85–474).

TO PERMIT PAYMENT OF A RATE EQUIVALENT TO THE "HIGHEST RATE PAYABLE UNDER THE CLASSIFICATION ACT"

There are currently in effect 57 statutory authorizations to permit employment of experts and consultants to be paid at a rate which is not to exceed the equivalent to the "highest rate payable under the Classification Act."

Mr. Minshall. What is the reason for the wide discrepancy?

Mr. Lanman. The basic law provides we can only hire these indi-

viduals, sir, when so specified in the Appropriations Act concerned and at the rates specified in Appropriation Act concerned, so that each agency, when its appropriation is heard, makes its case for the rate they need. So far we have had only $50, which, at the time it was put in, was somewhat higher than that amount which we could pay a classified civil servant. Now the $50 amount is over $6 a day lower than we can pay the highest classified civil servant.

Mr. ANDREWS. If this language is deleted what would keep you from paying $75 or $100?

Mr. LANMAN. The basic law which specifies we can only pay the amount equivalent to the highest daily rate payable to a GS–15 classified servant.

Mr. FORD. What amount is that?

Mr. LANMAN. $56.56.

Mr. MAHON. Is it the official position of the Department of Defense that the $56.56 per day rate is desirable and is that what you support?

Mr. LANMAN. That is correct, Mr. Chairman.

Mr. MAHON. And that might vary?

Mr. LANMAN. It is not to exceed that amount, and under regulations prescribed by the Secretary, determinations are made with regard to the value of the services of each individual to the Department.

Mr. FLOOD. In how many cases did you pay less than $50 last year?

Mr. LANMAN. I do not know, but there were some.

Mr. FLOOD. Many?

Mr. LANMAN. We can supply that for the record.

Mr. FLOOD. I am sure you will find some just to protect your flank, but many?

General FRIEDMAN. In the instance of the Air Force, in the scientific and engineering classification, there were 223 that got an average of $47 and in "Other" there were 108 paid at an average rate of $47.50. The largest majority in the medical, a little over 1,000, were paid at the $50 average rate.

Mr. MAHON. What percentage of the total number were paid less than $50? You can supply that for the record. I am speaking now of all of the services.

Admiral ENSEY. We paid approximately 60 percent $50 a day and the remainder were below that.

(The requested information follows:)

DEPARTMENT OF DEFENSE

Of the consultants 75.8 percent were paid the maximum $50 rate (3,008 out of a total of 3,970 consultants).

Mr. ANDREWS. Can you tell us how much this language change would cost approximately?

Mr. LANMAN. I can supply that for the record.

(The requested information follows:)

It is estimated this proposal would cost a maximum of $306,614 annually.

Mr. MAHON. How many people in the whole Defense Department have been employed on a per diem basis? How many days were involved, and what was the total expenditure for 1957, the estimated or actual for 1958, estimated for 1959, and estimated for 1960? I believe that we have some of that information in the record, but supply that which is not in the record.

(The requested information follows:)

Statistics and cost data for employment of experts and consultants within the Department of Defense, based on latest available figures [1]

Number of consultants employed on per diem basis within DOD	3,970
Number of man-days involved	46,740
Total expenditure for fiscal year 1957	$2,255,670
Estimated for fiscal year 1958 [2]	$2,255,000
Estimated for fiscal year 1959	$2,255,000
Estimated for fiscal year 1960	$2,255,000

[1] Most recent departmentwide report covered total employment for fiscal year 1957. Spot check made for fiscal year 1958 indicated employment was at about the same level.
[2] Based on assumption that the number of consultants employed and the duration of their employment would be approximately the same as in fiscal years 1957 and 1958.

Mr. MAHON. You may proceed.

SECTION 603—INSTRUCTION AND TRAINING OF CIVILIAN EMPLOYEES

Mr. LANMAN. The next change is on page 179, section 603, a recommendation for deletion of the phrase "instruction and training including tuition, specifically approved by the secretary of the department concerned, and not otherwise provided for, of civilian employees."

A permanent law was enacted by the Congress last year, Public Law 85–507, approved July 7, 1958, which provided a substantial and comprehensive system for the provision of instruction and training of civilian employees in the Federal Government. The primary responsibility for the implementation of this act is in the Civil Service Commission. They are currently implementing it through regulations. We would no longer need this authority in our appropriation act.

Mr. FORD. Does that give much broader authority for various courses and programs than what we might visualize just by looking at this language deletion? I am thinking, for example, of an age-old controversy we have had here about whether or not men in the service should be sent to law school at Government expense.

Mr. LANMAN. This would not cover the military at all.

Mr. FORD. Not at all?

Mr. LANMAN. No, sir. This relates only to the civilian employees. I understand the enactment of the permanent law was after long deliberation by the Post Office and Civil Service Committee. We are simply pointing out we would no longer need this language.

PROTECTION OF DOMESTIC PRODUCTS

Mr. MAHON. We will now proceed to a discussion of the elimination of the Berry amendment.

Mr. DEAN. I am here today to testify recommending the elimination of the so-called Berry amendment, which was section 626 in the act.

Mr. MAHON. What page?

Mr. LANMAN. Page 192.

Mr. FLOOD. Is it not section 625?

Mr. DEAN. It is section 625 in the 1959 act.

It starts as follows:

No part of any appropriation contained in this act shall be available for the procurement of any article of food, clothing * * *

Are you ready for me to proceed, Mr. Chairman?

Mr. MAHON. You may proceed.

Mr. DEAN. The difference of opinion between those who believe that the so-called Berry amendment should be retained in the Defense Appropriation Act and those who believe that it should no longer be included in the 1960 act cannot properly be designated as a question of protection for domestic products versus free trade. Rather it is a difference of opinion as to the degree of special preference to be given the domestic product. Even if the Berry amendment is eliminated, the domestic bidder will continue to have all the advantages of the "Buy American" Act.

That, of course, is a separate piece of legislation.

Mr. MAHON. It might be well to insert the pertinent parts of the "Buy American" Act in this point for the benefit of those who will later study this record in connection with this controversial issue. Will you do that?

Mr. DEAN. Yes.

(The requested information follows:)

THE "BUY AMERICAN" ACT

The "Buy American" Act of March 3, 1933 (47 Stat. 1520, 41 U.S.C. 10a–10d) requires that Federal Government departments and agencies when purchasing supplies for public use within the United States shall purchase raw materials mined or produced in the United States or manufactured supplies of domestic origin when such are available, unless the price of the domestic article is "unreasonable" or the purchase of the domestic article is "inconsistent with the public interest."

Executive Order 10582, December 17, 1954, in order to provide for more uniform application of the "Buy American" Act, defined materials of foreign origin as where 50 percent or more of cost constituted foreign products. It defined "unreasonable" as a differential of more than 6 percent, in most cases. It allowed for exceptions from the general rule in the national interest, for small business; for products of surplus labor areas, and for national security reasons.

Mr. DEAN. In general, procurement for the Department of Defense would then be on the same basis as procurement for other Federal departments and agencies and not as, at present, subject to special restrictions.

The "Buy American" Act, as administered by executive order, requires that when purchasing for use in the United States, a bidder offering foreign goods must pay the tariff duty on the goods in question and, even so, his bid will be evaluated to give a preference of 6 percent to the lowest domestic bidder. If the domestic goods are produced in a surplus labor area, this preference is increased to 12 percent. These preferences will not be affected by anything that is done about the Berry amendment.

The Berry amendment (it was sec. 625 in the 1959 act) applies only to defense procurement; other appropriation acts do not contain similar provisions. It applies only to articles of food or those made from textile fiber. But for such articles, it is very restrictive, giving a practical monopoly to the domestic article, made from domestic components. In general, it applies to procurement for use outside of the United States as well as within.

Whenever competition on bidding is restricted, the cost to the taxpayer goes up. Since foreign bids have not even been received on food and textile items for many years, it is difficult for the Office of the Quartermaster General, Department of the Army, which makes

such purchases for all three services, to estimate how much greater the cost is. As a rough computation, they estimated that in fiscal 1958 it was about $70 million on a program of $850 million or about 8 percent. For products used overseas, there are also additional transport costs and the cost of storing the larger amounts needed in the distribution system than would be the case if purchases were made nearer the point of use. Of course, it is also difficult to determine specifically just who benefits from this amendment and how much.

The United States has troops stationed in many parts of the world. It believes that bases in foreign countries are essential to the security of the United States and important to the free world. It is no secret that this situation results in politicoeconomic problems with the countries where the troops are stationed. No system of procurement will eliminate such problems, but it would be possible to generate considerable good will if it were possible to make locally those purchases which can be economically so purchased.

The Department of Defense accordingly requests that the major part of the section (it was sec. 625 in the 1959 act), which places special restrictions on Defense purchases of articles of food and fiber, be eliminated. (This request would leave in the bill the last proviso, which concerns a differential for relieving economic dislocations, which is a totally different matter.) The Secretary of Defense has testified before the Ways and Means Committee in support of the extension of international trade. The Department of Defense wishes to support the President's specific request in the budget message to eliminate the "Berry amendment." It believes that there would be a substantial resulting saving of Federal funds. It believes that it would result in greater uniformity in the conditions of Government procurement. It believes that, if all facets are considered, it is in the security interests of the United States.

NONCOMPETITIVE BIDDING

Mr. MAHON. I would like to ask you a few general questions.

Is it correct to say of all defense procurement probably about 85 percent of it is on a noncompetitive bid basis?

Mr. DEAN. I have never made a study of that, but considering the very large proportion of the total expenditures that are for military hardware items which are not generally suitable for competitive bidding, I think that would be a safe figure.

Mr. MAHON. There is considerable argument as to whether or not some of this work is suitable for competitive bidding. There are those who feel that the Department of Defense has encouraged the policy which has not made it possible to have competitive bidding in areas where competitive bidding would be in the best interests of the country. We had a witness here today, a very important witness, who pointed out with pride he had been helpful in bringing about a condition whereby there was competitive bidding in a very technical area.

I have in mind your statements:

Whenever competition on bidding is restricted, the cost to the taxpayer goes up.

Mr. DEAN. I was applying that generalization, Mr. Chairman, to these particular items which we are concerned with in this section.

Mr. MAHON. It seems to me if competitive bidding is such a good thing for the Department of Defense it is rather singular that the Department is waking up at this late hour to speak about competitive bidding.

EFFECT OF DELETION ON FARMERS

Mr. FLOOD. Let me point out to you that this is not my province and I may be in error, but what I have in mind is the veritable monopoly in the weapons system building that is being fostered by the Department of Defense. They have reasons why it is good, so on and so on, and the policy there is obviously to throw an arm of protection around these great industrial hardware manufacturers. Are they ganging up on our farmer here? That seems to be a blow at your side of the street, Mr. Chairman. They are greatly concerned about these fantastic empires of weapon systems builders that they are creating, yet now these people arrayed against food. Food means the farmer.

Mr. MAHON. There is some relationship between the farmers, food and fiber. I was disappointed the presentation was not arranged here to show why we would get more for our money.

Mr. FLOOD. May I suggest further that maybe all of the retired admirals and all of the retired generals of all the branches of the service are not sitting on the board of directors of farm groups. Apparently these special pleaders are not to be found in the area of food.

Mr. ANDREWS. The first sentence of the last paragraph indicates to me that this is directed against the farmer.

> The Department of Defense accordingly requests that the major part of the section, which places special restriction on defense purchases of articles of food and fiber, be eliminated.

That is all, food and fiber—the products of the farmer.

Mr. MAHON. There is another statement in the fourth paragraph, the last sentence:

> Of course, it is also difficult to determine specifically just who benefits from this amendment and how much.

Mr. FLOOD. I underlined that.

Mr. DEAN. Let me say that I am only here to speak about this one section and these articles are already subject to competitive bidding. The elimination of this section would widen the number of people that can bid, but it would not change what is the present system of competitive bidding on this type of article.

If you wish me to speak to that other sentence, I admit it is somewhat obscure, and I would be glad to talk to it.

Mr. MAHON. I wish that you would elucidate on "Of course, it is also difficult to determine specifically just who benefits from this amendment and how much."

We would be interested in knowing

Mr. FLOOD. Of course.

Mr. DEAN. What that sentence is designed to point out is that big as this total defense procurement of food and fiber is, it is a very small proportion of the total sales of such items in the United States, and therefore the proposal that we are making would probably have little, if any, effect upon the total sales and probably no effect at all upon the prices obtained for food items and fiber items.

Mr. MAHON. You mean that we might adopt this provision as recommended and eliminate the Berry amendment but would not be able to cut the bill proportionately in some other area by reason of the savings that would result by reason of the elimination of the language?

Mr. DEAN. I am not sure that I understand your question.

Mr. MAHON. You are going to save money by eliminating the Berry amendment. How much? If we go along with this elimination, where can we make the reduction?

Mr. FLOOD. And if you do not know, what difference does it make?

Mr. DEAN. This last statement referred to is put in after the rough estimate of how much the savings would be. We can make a rough estimate of that. We estimated it to be roughly $70 million on defense purchases in this area. We make no suggestion as to what you do with that $70 million if you save it. That is up to the committee.

Mr. MAHON. Particularize on how you would save this. What would be the technique that would be followed, with the elimination of this amendment, that would enable you to save $70 million?

Mr. DEAN. A great deal would be saved on items of food and fiber which are shipped for use overseas where you could buy near at hand to the point of use at considerable savings over what it takes to buy in this country and ship it abroad to warehouses.

Mr. MAHON. That is an area where we need some specific information. I have an open mind on that part of the question. How can you establish something here that would be sufficiently definite that would cause us to take action. The Department spent a long time to work up its case and it is all boiled down on one page and it is very general.

Mr. DEAN. You cannot give a better estimate than this which we admit is very rough, because for 10 years or more you have not had any bids.

Mr. MAHON. What do you mean?

Mr. DEAN. Those offering foreign goods are not allowed to bid. If we want to buy food for the troops in Japan procurement officers are not allowed to buy the food locally; in general, they are not allowed to take local bids. You cannot, therefore, compare accurately the difference in cost between buying locally and buying in this country and shipping it over.

Mr. MAHON. Of the $70 million how much would be saved probably in the fiber field and how much in the food field, and so forth?

Mr. DEAN. Last year when I testified on this I had a man from the Quartermaster General's Office along to answer such specific questions and he did not get any, so I did not bring him this year. This is what was in last year's statement on this matter. It estimates that for fiscal year 1958, out of a total of $150 million for clothing and textiles there would have been a purchase saving of about $30 million. Similarly, out of a total program of about $700 million for food, about one-third of which was used overseas, there would have been a purchase saving of about $40 million.

That is broken down between food and fiber. That is the best that I can do for you.

Mr. MAHON. Do you mean if in Japan our officials could buy Japanese textiles for our troops in that general area it would be financially to the advantage of the Defense Department; is that it?

Mr. DEAN. That is part of it. Under the "Buy American" Act you could in some cases make savings by producing domestic uniforms out of part foreign components and part domestic components, because the "Buy American" Act defines as a domestic product anything that is of more than 50 percent domestic value.

USE OF DOMESTIC WOOL

Mr. MAHON. The largest percentage of the wool that we utilize in this country is foreign-produced wool, is it not?

Mr. DEAN. Not for uniforms, because of the Berry amendment. They have to use domestic wool.

Mr. MAHON. Exclusively?

Mr. DEAN. They pay a premium for domestic wool, or for fabrics made of domestic wool. That is part of the procurement policy.

Mr. WEAVER. Did Secretary Benson have anything to do with this recommendation?

Mr. DEAN. No, sir.

EFFECT OF PROVISION ON RECIPROCAL TRADE ACT

Mr. FLOOD. You began by saying that there is a difference of opinion. Who speaks for the other opinion? You are speaking ex parte for the Department of Defense. Who is the other side? Can you wear two hats? Can you be the devil's advocate?

Mr. DEAN. I think that I could be the devil's advocate if necessary, sir.

Mr. FLOOD. Go ahead.

Mr. DEAN. I would say the past practice of having this thing in the law was the other side.

Mr. FLOOD. You have restated the question. Elucidate.

Mr. DEAN. I cannot determine exactly why the section was put into the law.

Mr. FLOOD. Why do you think it was? You say that you are the devil's advocate. There is a difference of opinion. You have stated your opinion. What is the other opinion? Do you know?

Mr. DEAN. The other opinion is that it is worthwhile for the United States to pay these additional amounts in order to have these particular products produced wholly from domestic components.

Mr. FLOOD. In effect, this suggestion of yours is emphasizing and extending the reciprocal trade agreements act by emphasizing these developments that are not emphasized in the reciprocal trade agreements act?

Mr. DEAN. That would be one way of putting it. Another way of putting it is this is the farthest out in Federal procurement for special favors to domestic products. It is therefore farthest away from the administration's position to foster international trade, which is reflected in the Trade Agreements Act.

Mr. FLOOD. Can you imagine what may have happened to a close vote on the Reciprocal Trade Agreements Act in the House if you had ruffled the tail feathers of the farmers, as this would have done?

Suppose the devil's advocate were to have taken off his moustache and trotted this out in the middle of the Trade Agreements Act when everybody's nerves were upset, and everything was touch and go for 3 or 4 days. Can you imagine what the farm bloc would have done? We have passed that act.

Mr. DEAN. May I say that, when I appeared here last year and made exactly the same request, it was before the Trade Agreements Act had been extended.

Mr. FLOOD. But it was not in the Trade Agreements Act, and you did not get this last year.

Mr. DEAN. That is correct.

Mr. FLOOD. That follows, QED.

Mr. DEAN. We were honest about it and asked for it before the act passed.

Mr. FLOOD. I am not talking about you. I am talking about those who started the Trade Agreements Act. What would the farmers have done with this in it?

PURCHASE OF BEEF

Mr. MAHON. Is there anything to keep you from buying perishable food from local sources overseas?

Mr. DEAN. There is an exception in the Berry amendment for perishable foods which has been interpreted to be fresh food. Frozen beef, for instance, has been determined not to be perishable food under the way this is administered.

Mr. MAHON. The implication of your statement is if you buy a lot of beef for oversea use you would buy it in this country.

Mr. DEAN. I think it is likely if the Berry amendment had not been on the books there would have been some foreign beef purchased for use abroad.

Mr. MAHON. Do we not buy some fresh beef abroad? Do we not buy some fresh beef abroad that is not frozen?

Mr. FLOOD. Is this the Argentine amendment that we ran into year after year all covered up to buy Argentine beef for the Department of State and bail out an ambassador?

Mr. DEAN. This has nothing to do——

Mr. FLOOD. I wonder why I am carrying this argument.

Mr. FORD. I thought the chairman asked a question that was not answered when you interrupted. I did not get the answer.

Mr. DEAN. May I have the question restated because I want to try to answer anything I can.

(The question was restated.)

Mr. DEAN. I would hate to answer that because I am not sure of the answer. I do know that they do not buy the frozen beef. Whether or not they buy any fresh beef anywhere in the world I cannot tell you. My guess is that they do not. I do not want to give you that as anything more than a guess. Frozen beef is not considered perishable.

Mr. FLOOD. This raises the problem of the great debate that we have had about the shiploads of Argentine beef going to England and transferred in the books in the British Isles for American troops. It caused quite a furore. I do not actually know much about the full operation, but I suppose this would be an open sesame for practically the same thing?

Mr. DEAN. A man from the Quartermaster General's Corps last year in answer to a question said there had been none of this beef bought for troops issue since 1948 when this ruling of the Comptroller was made that beef was not perishable. Up to that time it had been considered perishable.

Mr. FLOOD. This has nothing to do with the case, tra-la. What does it have to do with the problem?

Mr. DEAN. I am just trying to answer questions.

Mr. WEAVER. In one part of your statement you say savings will result and in another part you say this situation results in political and economic problems for the country.

Mr. DEAN. We think both.

Mr. WEAVER. What country?

Mr. DEAN. The statement does not say that these political and economic questions arise because of this. I would not want to give that impression. There are difficulties with troops in North Africa. There have been difficulties with troops in Japan. In many parts of the world where we have troops there is antagonism. The statement made about political and economic problems is meant to imply that if you are doing some substantial local buying there you have some of the natives, at least, that are favorable to the troops being there because they get some business out of them.

Mr. MAHON. Off the record.

(Discussion off the record.)

"BUY AMERICAN" ACT PROVISIONS

Mr. MAHON. Are there further questions?

Mr. OSTERTAG. The Buy American Act, which is referred to in your statement, is a general act covering all Government agencies, is it not?

Mr. DEAN. Yes, sir.

Mr. OSTERTAG. That is flexible depending on the order of the Executive?

Mr. DEAN. Yes, that differential is fixed in an Executive order rather than in the law.

Mr. OSTERTAG. You refer to it as being 6 percent. Is that what it is today?

Mr. DEAN. Yes, sir, 6 or 12.

Mr. OSTERTAG. Six or twelve?

Mr. DEAN. Six percent is the ordinary rate. However, if the domestic goods being bid on come from a surplus labor area, the differential which is allowed in favor of the domestic is 12 percent instead of 6 percent.

Mr. OSTERTAG. Then if this amendment were made to the appropriations bill, eliminating the so-called Berry amendment, the Buy America Act would still apply. Is that correct?

Mr. DEAN. That is correct.

Mr. OSTERTAG. And the differential would be 6 percent as of today?

Mr. DEAN. That is correct, at least 6 percent.

Mr. OSTERTAG. The Berry amendment is more or less a prohibition, is it not?

Mr. DEAN. It is.

Mr. OSTERTAG. There would not be any prohibition under the "Buy American" Act?

Mr. DEAN. No, they can bid with domestic goods or foreign goods. The differential takes place in the way in which the bids are appraised. The differential is a special incentive given to the domestic bidder.

Mr. OSTERTAG. But there will be a differential rather than an outright prohibition?

Mr. DEAN. That is correct.

Mr. FLOOD. Take $70 million off the defense budget and put it onto Mr. Benson's farm aid bill.

Mr. MAHON. Off the record.

(Discussion held off the record.)

HISTORY OF LEGISLATION

Mr. FORD. How long has this amendment been in the Appropriation Act?

Mr. DEAN. The Berry amendment as such first appeared in the Appropriation Act for fiscal year 1953. However, there were some somewhat similar provisions in the War Department Appropriation Act going back as far as 1942, and in the Navy Department I think there has been, also, although I have not searched the records.

Mr. FORD. Could we have a chronological history of this type of legislation in the record some place?

Mr. DEAN. More than in my answer, sir?

Mr. FORD. Perhaps you might want to make a study of the situation and include the citations as to when it had its inception and what its development has been.

Mr. DEAN. If you wish.

(The information requested follows:)

CHRONOLOGY OF BERRY AMENDMENT

Defense Appropriation Act for fiscal year—

1952 and earlier: Department of Army item "Subsistence of Army" contained restriction against procurement of foreign food and clothing.

1953: Department of Army item "Maintenance and operations" included restriction on procurement of articles of cotton and wool as well as food and clothing.

1954: As section 644, appeared in General Provisions of Defense Appropriation Act. Included restrictions on all services as on Army in 1953.

1956: (Section 630.) Included restriction on silk yarn for cartridge cloth as well as products formerly covered.

1957–59: No change from 1956 except number of section changes year to year.

PURPOSE OF REQUESTED DELETIONS

Mr. OSTERTAG. The whole purpose is not to overcome a hardship, is it, but primarily to save $70 million which is your estimate of the difference.

Mr. DEAN. I think the primary purpose in presenting this, is to point out that it seems to us, at least, somewhat illogical that the Department of Defense Appropriation Act should have in it certain special restrictions which are not found in the appropriation acts of the other Departments and which thereby make procurement different in our Department from that in other Departments.

We also think that the amount of funds involved, even though they cannot be exactly calculated, are not peanuts, and that this amount could be saved without changing the farm program. Your basic protection for the farmer is the farm program.

As a matter of fact, the farm program—

Mr. WEAVER. Not Mr. Benson's program?

Mr. FORD. The existing one which Congress passed.

Mr. DEAN. The farm program which we have had on the books. As a matter of fact, the farm program that you have has made the Berry amendment somewhat more serious than it otherwise would be as far as the amount of appropriation is concerned because of the fact that it has in many cases kept U.S. prices for these goods above world prices.

Mr. OSTERTAG. Was it a matter of hardship or savings? You still have not directed your answer to either one.

Mr. DEAN. I do not think it is a hardship, sir. I am not quite sure what you mean by hardship.

Mr. OSTERTAG. Hardship on the Defense Department to operate under——

Mr. DEAN. It is not a hardship. Defense has operated under it for a number of years and carried out the law faithfully, and it will do so as long as it is in the law.

Mr. MAHON. And the average per day feeding cost is approximately how much in the services?

General TRAUB. About $1.12.

Mr. FLOOD. Do you happen to have a plan of distribution by priority for the various services as applied to them, what you would do with the $70 million, or would you decide that later?

Mr. DEAN. I do not consider that is our problem, Mr. Chairman.

LOCATION OF SAVINGS

Mr. FLOOD. It is a problem of the Department of Defense. You want to save $70 million. What do you want to do with it? You want to turn it back to the Treasury? This is your bill.

You come up here with a highly commendable suggestion of saving $70 million, a suggestion which meets with great approval on our part, as unusual as it is. It is the first one I have seen.

Now that you have done this so nobly I am sure you want to tell us what you will do with it.

Dr. DEAN. My own opinion on that, Mr. Chairman, is that, if you wish to eliminate this item, you should eliminate it and find out exactly how much it does save, because at the present time these estimates have to be proven.

After you have 1 year's experience with the amount of saving, then I would think that the budget people plus this committee would know what to do with the $70 million, or whatever amount it turned out to be.

Mr. MAHON. You have not been able to find out how much it costs by having it in. You mean to say by having it out you think you can tell by that technique what you would save?

I do not quite get that.

Mr. DEAN. If you went out to buy a television set and you could buy it from only one of three dealers, you could not tell how much

you could save if you were allowed to buy it from somebody else——

Mr. FLOOD. Remember the President's reciprocal trade agreement program.

Mr. MAHON. Will you please spell out for the record at this point, immediately following this question, the exact location of the specific savings by services insofar as possible?

(This question has been referred to the Office of Quartermaster General, Department of the Army, as a matter of urgency. The answer will be transmitted as soon as it is available.)

Mr. MAHON. At this point in the record, and immediately following this question, will you please spell out approximately, as far as it is possible for you to do so and in your opinion, the procurements in food, fiber, and otherwise which would have taken place during this fiscal year of 1959 had the Berry amendment not been the law? How different would it have been? What would the procurements be?

(This question has been referred to the Office of Quartermaster General, Department of the Army, as a matter of urgency. The answer will be transmitted as soon as it is available.)

WEAPONS CONSTRUCTION OVERSEAS

Mr. ANDREWS. Is there any law which requires our naval ships to be constructed in the United States?

Mr. DEAN. That is a subject I am not familiar with.

Mr. ANDREWS. Do you know of any such law?

Mr. DEAN. No, I do not know.

Admiral ENSEY. I know of none, sir. We do have the one about whether it is in commercial or Government shipyards.

Mr. ANDREWS. I am not referring to that.

Admiral ENSEY. I know nothing about this other one.

Mr. ANDREWS. Could you tell me how much cheaper we could have our ships built overseas in Japan, Italy, England or Germany?

Admiral ENSEY. Not offhand but it would probably be cheaper.

Mr. ANDREWS. If you built your ships overseas you would save more than $70 million, would you not, if you built only half of them overseas?

Admiral ENSEY. That might be, sir.

Mr. MAHON. What about trucks for the Army?

Mr. ANDREWS. And airplanes, and everything.

Mr. FLOOD. Small arms in Italy. Will you build small arms in the great Italian machine industry?

Mr. MAHON. It would be said this would be a security problem, but certainly if you wanted to completely ignore the welfare of American industry and labor you certainly could have a considerable number of these things done overseas.

Mr. ANDREWS. I would go along with abolition of this amendment if we could make all our purchases overseas. We would save considerable sums.

Mr. OSTERTAG. You do not want to do that.

Mr. ANDREWS. No, not one against the other.

Mr. FORD. Off the record.

(Discussion held off the record.)

Mr. MAHON. Thank you very much, Mr. Dean. We will be glad to give this matter further consideration.

Mr. DEAN. I will be glad to see that we furnish as much of the information required as possible.

I think some of your questions will be rather difficult to answer. I will do the best I can.

Mr. ANDREWS. Will you supply the difference between the cost of constructing any type ship in this country and some two or three foreign countries?

Mr. MAHON. As best you can, Admiral Ensey.

(The information requested follows:)

Approximate cost of constructing destroyer escort type ship in several countries

United States	$19,000,000	United Kingdom	$12,300,000
Italy	14,250,000	West Germany	9,500,000
France	13,300,000	Japan	9,500,000

Mr. MAHON. I wish to thank Mr. Dean for his appearance here. I am afraid we may have appeared to be a little rough, a bit rude toward him. This is not intended. We realize he has appeared before us to do his duty as a representative of the Department of Defense. Thank you very much, Mr. Dean.

EDUCATION OF DEPENDENTS OF MILITARY AND CIVILIAN EMPLOYEES OVERSEAS

Mr. MAHON. Let us proceed with the next item.

Mr. LANMAN. The next change was on page 180 of the committee print, section 606.

This change is in the amount of the average cost for the education of dependents of military and civilian employees overseas.

In the Supplemental Appropriation Act for 1959, the Department justified and this committee granted an increase from $245 to $265 for this average.

This change in this section at this time reflects the Department's request for a similar amount for fiscal year 1960.

Mr. WEAVER. What will be the total cost?

Mr. LANMAN. I do not have the total cost of the change.

We operated——

Mr. WEAVER. You picked it up on the supplemental?

Mr. LANMAN. For 1959.

Mr. WEAVER. Do you have that total?

Mr. LANMAN. We can supply that information, sir.

Mr. OSTERTAG. Is it budgeted for fiscal 1960?

Mr. LANMAN. Yes, sir, budgeted on the basis of this language, $265.

Mr. FORD. As I recall the facts, last year, when we were considering the fiscal 1959 bill, this same request was made for an increase from $245 to $265. Is that right?

Mr. LANMAN. I believe last year we did not request it until later in the year and it got into the supplemental request for fiscal year 1959, sir.

It results primarily from the civilian pay increase.

Mr. ANDREWS. What have you paid for fiscal 1959? Is it $245 or $265?

Mr. LANMAN. $265, sir. Overall average was $263.37 for fiscal year 1959.

Mr. FORD. It is my recollection we made no change last year in the Defense Department appropriation bill.

Mr. LANMAN. My recollection is that—I do not believe we asked——

General FRIEDMAN. I can assure you there was no such request submitted. I came here with Secretary Jackson when it was presented.

Mr. FLOOD. I presented a series of amendments based upon this proposal after a survey trip last year, you might remember, on this specific paragraph.

Then there was general discussion and we decided not to vote on my amendments because somebody, I think it was Mr. Crosby, raised the question that perhaps this would come up since there certainly would be pay increases developing during the year in supplementals, and was this not closely related to the pay increases, and were not my figures based upon a desire to increase the pay of teachers and other things related to instruction; and that was true, of course.

We dropped the debate at the markup and it caught up with the pay raise bill.

Mr. LANMAN. That was the basis of the request.

Mr. FLOOD. We never acted on the amendments. I withdrew them based on that suggestion.

Mr. FORD. It was a surprise to me that this figure of $265 is now the law based on action taken in a supplemental.

Mr. LANMAN. Which was in turn justified on the basis of the civilian pay increases over last year.

Mr. FORD. You ought to justify it now on the basis of pay increases for fiscal 1960.

Mr. LANMAN. I am confident that the information furnished at the time of the 1959 supplementals can be shown to be equally applicable to 1960. We will be glad to do that for the record.

Mr. FORD. I would like to have them in the record. I think you will have to stretch a point to justify $20 per pupil, justifying this increase.

Mr. MAHON. Will you submit for the record the most correct and helpful statement that you can based on the hard facts of this matter and present a copy of the statement for the record of the savings to Mr. Crosby?

Mr. FORD. I also would like to have how much in dollars this represents as an addition to the budget. I cannot accept at face value the justification which has been presented here, and I do not want some cursory presentation in the record.

I want a full and complete submission.

My offhand impression is that it cannot be justified but I will wait and take a look at the record.

Mr. LANMAN. The impact of the civilian pay increases largely results from the fact that by far the larger majority of these schools are service operated as distinguished from the payment of tuitions to other schools. This is the reason for the expense of the civilian pay increase looming large in fiscal year 1959.

We will see to it that the record is ample.

(The information is as follows:)

Approximately 85 percent of the total dollars expended in the education of dependents program is for salaries.

Prior to the passage of the civilian pay increase the limitation was $245 per pupil. Since salaries represent about 85 percent of the cost; 85 percent of $245 equals $208.25. A 10-percent increase (the average civilian increase) over $208.25 is $20.825. This was rounded down to $20, and when added to the $245, produced the $265 figure.

The average number of pupils for fiscal year 1959 is estimated at 111,605. $20 times 111,605 is $2,232,100.

The increased cost can be estimated another way; there are 4,551 professional personnel in the school system, over 4,000 of whom are at the GS–7 level. The remaining number are at higher grades, up to and including GS–15. The civilian pay increase for the third step of GS–7 (assumed average rate) was $485, $485 times 4,551 equals $2,207,745.

Mr. FLOOD. I remember in the discussions on my amendments, somebody pointed these out to me, that it was a 10 percent pay increase that somebody told me we would anticipate, which is exactly what we did.

The 10 percent came out to about $20, which would be the difference between $245 and $265. I think this is a mathematical problem and I think the records will satisfy Mr. Ford almost by multiplication.

EMPLOYMENT IN PANAMA CANAL ZONE

Mr. LANMAN. The next changes are on page 181 in section 607.

The first change in that section is a recommendation for the deletion of the language which has been carried for many years which among other things limits employment in the Canal Zone to United States and Panamanian citizens.

Mr. CROSBY. This is a new section. I merely want to determine whether all of this language, as it is reproduced here, has previously been carried in the bill.

Mr. LANMAN. All of the language as it appears in italics there has previously been carried for many years in both the personnel appropriations of the Army and of the Air Force in identical phraseology.

Mr. CROSBY. This brings it to one place in the bill.

Mr. LANMAN. That is right.

Mr. MAHON. Is there anything additional thrown in?

Mr. LANMAN. No, sir.

Mr. OSTERTAG. It substitutes what has been in here for this new language.

Mr. LANMAN. There is no new language included in this section. We simply removed old phrases from three of the military personnel accounts, most of them from the Army and Air Force accounts. Since they were applicable across the board we placed them here. They do not have in and of themselves any substantial budgetary implications. They do not cover any program as such.

Mr. FORD. What is the justification for the deletion of this portion of the language under 607 which applies to the Panama Canal? I do not understand that.

Mr. LANMAN. Last year, as a result of the treaty of 1955, between the United States and Panama there was enacted Public Law 85–550. This act constitutes a comprehensive system of wage and employment practices and policies in the Panama Canal Zone.

This act was enacted by the Congress in order to conform the policies and practices with the treaty.

Mr. FORD. The inclusion of section 607, that part which is recommended for deletion, would negate parts of that treaty?

Mr. LANMAN. That is correct, sir.

Mr. FORD. That is why you want to have it deleted?

Mr. LANMAN. We believe Congress, in recognizing the treaty and enacting a comprehensive statute for the purpose, has eliminated a necessity for special provisions on the same matter.

Mr. FLOOD. I have assumed certain burdens, vis-a-vis the Republic of Panama. This treaty embraces them in a rather general way. You can get different opinions about how much the State Department is giving away in the Republic of Panama.

Of course, that is a matter for the Senate, and we sadly constitutionally cannot act upon treaties.

You refer to a treaty and take the position it is the supreme law of the land.

Mr. LANMAN. What I was pointing out is that the Congress as a whole enacted a statute.

Mr. FLOOD. To execute the treaty?

Mr. LANMAN. Yes.

IMPLEMENTATION OF TREATY WITH PANAMA

Mr. FLOOD. I am sadly aware of the whole proposition.

This has been the law or some time, and for reasons best known to the U.S. Government, and I think those reasons should be best known to the U.S. Government, the implementation of this treaty has not yet been brought about.

I do not think this is the time for this committee to do anything to permit the politicians in the Republic of Panama to take the action of the Appropriations Committee and of this House to criticize the Government of the United States, and as sure as you take this action—Mr. Chairman, there is a difficult situation existing in the Republic of Panama.

The press of Panama and the Government of Panama have been abusing and criticizing and reviling the President of the United States, the Secretary of State, the Secretary of Defense, and Governor Potter, and believe me they have been doing this. I am very close to this problem.

This action here will be construed at once by every "ten, twenty, thirty" politician in Panama as additional evidence that the Congress of the United States insists that the Executive implement and execute the laws placed upon the books.

The Government of the United States, the President and the Secretary of State who are responsible for the execution of these things, for reasons best known to themselves, have not been in a position to do this, and for many, many good reasons, with which I agree and which I cannot detail now.

I assure you this is not casual.

If this committee takes this action, every newspaper and politician in Panama will hold it up as a horrible example and beat the Government over the head with another example of where the Executive is not executing and implementing this treaty.

This is the biggest, most public and popular issue in Panama today—why doesn't the Government of the United States implement this treaty?

There are a lot of good reasons why not, a lot of good reasons.

For you today to do this will permit them to say—"There you are, the great Appropriations Committee, the Congress of the United States passed this bill. This will pass pro forma."

If it does it will be picked up.

Mr. FORD. I notice at the bottom of this provision 607 there is a proviso which states:

Provided further, That the President may suspend from time to time, in whole or in part, compliance with this section if he should deem such course to be in the public interest.

Mr. FLOOD. Right.

Mr. FORD. Has that been suspended in the past?

Mr. LANMAN. Consistently in major part, Mr. Ford.

Mr. FORD. For how many years?

Mr. LANHAM. I understand it is about 15 years.

Mr. FORD. In other words, this overall provision has been included in an appropriation bill for a number of years and it has been suspended in its effect all or most of the time.

Mr. LANHAM. By the President in his exercise of his foreign policy responsibilities, and that is the reason the suspension was provided for, sir.

Mr. FLOOD. This is no matter of great moment to the actions of this committee or the Defense appropriations bill.

I am sure the Department of Defense would not be a party to that. This is a routine, technical suggestion, I am satisfied, and nothing else, and as such I have no objection to it.

This is not the time, however. This has been going on for some time. There is a delicate political problem in existence, and I would not like any weapon to be placed in the hands of Panamanian demagogs to point as another example of where Congress again reiterates its desire.

It negates that section of the appropriation bill which prevents the treaty from being implemented.

Why should we lend ourselves to that kind of thing since it is not that important to our work and our bill?

If the President in his good judgment sees fit to implement and execute the treaty to which my friend refers, then as soon as that happens we can do this and nobody will ever hear of it again.

Mr. MAHON. General Moore, will you discuss this matter with the Defense Department and ask that the matter be taken up through other Government channels to determine whether or not it would be in the overall best interest of the Government for this language to be eliminated at this time?

General MOORE. I will do that.

Mr. MAHON. Have them clear with the Bureau of the Budget and with the Department of State on it, and report to us.

General MOORE. I will call to their attention remarks made this afternoon if I may.

Mr. MAHON. All right.

(The information is as follows:)

The State Department advises that in light of the enactment of Public Law 85–550 it favors the deletion of the language contained in section 607 of the Department of Defense Appropriation Act, 1959, from the standpoint of the foreign relations of the United States. The Bureau of the Budget concurs.

Mr. OSTERTAG. It is the Defense Department's proposal that we eliminate all of what has been section 607 and substitute this provision which is completely foreign to that and has no relation?

Mr. LANMAN. The subject matter has no relation to the earlier language.

General MOORE. Off the record.

(Discussion held off the record.)

Mr. MAHON. Proceed.

SCRAP AND SURPLUS DISPOSAL PROGRAM

Mr. LANMAN. The next change is at page 185, section 611. This is the section which relates to the use of operation and maintenance appropriations for expenses of the scrap and salvage the surplus property disposal program and reimbursement to that amount of only amounts which have been expended in the program.

Mr. McGuire discussed this, Mr. McNeil touched on it, and the only effect of these changes would be to remove the limitation of the $49 million which we are currently handling in this fashion.

Mr. MAHON. If we did not want to eliminate the limitation why could we not raise that figure; and, if we raised it, what would be a figure which would be adequately high to take care of the situation?

Mr. LANMAN. For fiscal year 1959 the program did exceed the $49 million limitation.

Mr. McGuire has testified consistently that the program is on the upswing. The estimate indicates that our proceeds form sales this year, fiscal year 1959, would amount to $225 million; for fiscal year 1960 it would amount to $250 million.

If you used a rough percentage estimate you would come out somewhere in the neighborhood of $60 to $70 million if you were making it on a like basis with 1959, but, as Mr. McGuire has stated consistently, he believes that with the emphasis he now has placed on this disposal program, it will move at a faster rate. But we are not able to give a solid estimate with respect to the rate at which it would move upward.

Mr. MAHON. I did not get to hear all of Mr. McGuire's statement. Did he make statements which would indicate that there is no danger of our disposing of materials which we really should not dispose of?

Mr. LANMAN. Yes, this program was thoroughly discussed when Mr. McGuire appeared here.

TRANSPORTATION COSTS FOR COMMISSARY ITEMS DELIVERED TO ALASKA

Mr. LANMAN. The next change relates to a technical change, page 186. This would continue the current practice you have authorized of not including transportation costs in commissary articles sold in Alaska.

The admission of Alaska to the Union requires the addition of the phrase "except Alaska" since Alaska now is in the United States.

This does not change the status of anything. The status of Alaska changed requiring a change in this language.

Mr. MAHON. Is Hawaii included?

Mr. LANMAN. At the time we made this recommendation Hawaiian statehood legislation had not been enacted.

EXEMPTION FROM ANTIDEFICIENCY ACT

Mr. MAHON. I would like to call your attention, General Moore, to section 612, page 186, which reads as follows.

During the current fiscal year, the President may exempt appropriations, funds and contract authorizations available for military functions under the Department of Defense from the provisions of subsection (c) of section 3679 of the Revised Statutes, as amended, whenever he deems such action to be necessary in the interest of national defense.

Will you clarify for the record what section 3679 contains?

General MOORE. That is the antideficiency statute. It is realized by the Congress, and I think very wisely so, that in the event of an emergency which comes upon us quickly we would have to speed up our use of the appropriations that we have at the date concerned, or we may have in the future out of this act now being considered, and that he would authorize the expeiditures at a rate faster than could be made without incurring a deficiency.

Of course, that would obligate the administration immediately to come down with such supplementals as they needed to take care of the emergency.

Mr. MAHON. I realized we have had this in the bill for many years. I have asked the question in order to get on the record the fact that this statement is here.

To what extent does the President resort to this?

General MOORE. Let me check this.

Mr. LANMAN. To the best of my knowledge this has been used once in the last 5 years. This related to some personnel costs that came about because of an increase in pay, and a personnel appropriation was exempted from apportionment.

It has not been used with frequency or consistency since the normal procedure under section 3679 is for the Secretary of Defense to notify the Director of the Bureau of the Budget who in turn notifies the Congress we anticipate the need for more money and he can, under certain conditions, then authorize us to incur obligations at a deficiency rate and submit a request for funds.

That is the ordinary means of doing this.

This provision is here in case, as the general said, of some emergency situation where the ordinary means would not provide for it in time.

Mr. MAHON. Amplify your statement sufficiently to make perfectly clear what this picture is.

(The following statement was submitted.)

SECTION 612

This provision authorizing the President to exempt appropriations of the military departments from the apportionment requirements of section 3679 of the Revised Statutes, when he determines such action to be in the interest of national

defense, was inserted for the first time as section 630 of the General Appropriation Act, 1951, the same act in which the amendments to section 3679 of the Revised Statutes providing for the apportionment procedures was enacted. Its most significant use was during the Korean emergency.

Antideficiency Act

Section 3679 of the Revised Statutes (31 U.S.C. 665), commonly known as the Antideficiency Act, was completely reenacted and brought up to date in the General Appropriation Act of 1951. The statute prohibits any officer or employee from making or authorizing an obligation or expenditure under an appropriation in excess of the amount available therein. It also forbids involving the Government in any contract or obligation to pay money in advance of appropriations unless authorized by law. In order to prevent appropriations from being utilized at too fast a rate the act requires apportionment by months, quarters, or other regular periods or by activities or functions or a combination of both methods. Any appropriation available to an agency in the executive branch, which is required to be apportioned under the provisions of the statute, is required to be apportioned in writing by the Director, Bureau of the Budget. Stated in broad terms the Antideficiency Act is designed to (1) prevent the incurring of obligations or the making of expenditures in such a way as to create a deficiency in an appropriation; and (2) require the agency administrative system's control over the creation of obligations or the making of expenditures be such that responsibility can be fixed if an apportionment or administrative subdivision thereof is exceeded.

While the act provides that the Director of the Bureau of the Budget may approve an apportionment in an account which, if utilized, would exhaust the appropriation prior to the end of the period for which the appropriation was made, and thus result in a need for a deficiency or supplemental appropriation, such authority is granted to the Director, Bureau of the Budget, only in the case of apportionments to be utilized for the preservation of life and property or to support the funding requirement resulting from laws enacted subsequent to the transmission to the Congress of the estimates for an appropriation.

SPECIAL ALLOWANCES IN ALASKA

Mr. Ford. I am not clear why you have to add "except Alaska." Does that mean that now that Alaska is a State we still have to subsidize the shipment of foodstuffs to Alaska?

Mr. Lanman. Because of the added cost of the transportation on account of the distance. When the committee put these restrictions into the act it was recognized that the cost of transportation to Alaska or elsewhere outside the United States, would increase the cost of the goods in the commissary to the personnel and their dependents.

Therefore, when the phrase including commercial transportation in the United States but excluding all transportation outside the United States, meant we had to charge prices which would return to the Treasury all the transportation costs so long as they were incurred in the United States, but if they were incurred in Alaska or elsewhere outside the United States we could exclude the costs from the price and thus equate the costs that the personnel and their dependents paid in Alaska to those in the United States.

This phrase is necessary since Alaska now is actually in the United States.

Mr. Mahon. It has been in the United States all the time, not as a State but as part of the United States.

Mr. Flood. An insular possession.

Mr. Lanman. That is right. We have always had to distinguish being in the United States and being a Territory.

Mr. Ford. Do military personnel stationed in Alaska or any civilian

personnel stationed in Alaska get a pay differential and, if so, how much?

Mr. LANMAN. I believe they do.

Mr. FLOOD. I believe such personnel are considered overseas for some purposes, such as tour of duty, and so on.

Mr. FORD. I am sure there are certain civilian employees who are stationed in Alaska who work for one of a number of departments, who do get a pay differential. At the same time, I am sure they have the benefit of the commissary. Is that right?

Mr. LANMAN. I believe that civilians do have the privilege of the commissary in Alaska. I do not know the answer to your specific question with respect to pay differential.

Mr. MAHON. Will you provide it for the record?

Mr. LANMAN. Yes, sir. I might say there has been a series of questions and answers related to this sort of thing as a result of the admission of Alaska. We shall be glad to supply for the record the information we have on the subject.

Mr. FORD. If a man in uniform gets no pay differential, then I can justify this, but if a civilian employee who gets a pay differential gets the benefit of the commissary, it makes no sense.

Mr. FLOOD. Or an employee of a contractor who under certain conditions is permitted to have this and because he works on some of these advanced areas in Alaska gets fantastic salaries on cost-plus operations in the Western Electric system. That is what you mean.

Mr. FORD. That is right. In other words, he is getting a subsidy twice, which is not justified. I think we ought to have a full and complete statement in that regard concerning this point.

Mr. LANMAN. We shall make that perfectly clear.

(The information requested follows:)

MILITARY PERSONNEL

Enlisted military personnel stationed in Alaska receive foreign-duty pay ranging from $8 to $22.50 per month depending upon their pay grades.

Military personnel stationed in Alaska receive a cost-of-living allowance which is based on the average cost-of-living index in the United States as compared to cost-of-living in Alaska. The cost-of-living allowance in Alaska varies according to the number of dependents, pay grade, and locality in which members and their dependents are stationed. Enlisted personnel for whom Government messes are available do not receive this allowance. The cost-of-living index includes all items of cost-of-living, except quarters. Availability and utilization of commissaries has been taken into consideration in determining the cost-of-living allowance in Alaska.

In addition, military personnel who are not furnished public quarters are entitled to a housing allowance, the amount depending on (1) rentals in Alaska as compared to the member's basic allowance for quarters (2) whether the members are with or without dependents and (3) the locality in which they are stationed.

CIVILIAN PERSONNEL

Civilian employees in Alaska whose positions are subject to the Classification Act of 1949, as amended, receive a cost-of-living allowance which is 25 percent of their basic compensation. This allowance is determined by the Civil Service Commission as a result of cost-of-living surveys conducted by the State Department in Alaska. Most recent surveys show that the cost-of-living in the major cities in Alaska exceeds the cost of living in the District of Columbia, the point of comparison, by varying amounts from 25 percent to 55 percent.

Wage board employees do not receive cost-of-living allowances. Their wages are fixed on the basis of locality wage surveys and generally reflect the higher rates of pay which are paid in Alaska.

Civilian employees of military bases who reside on the bases are permitted commissary privileges. In those locations where there are adequate shopping facilities off the base civilian employees who do not reside on the base are not given commissary privileges.

CONTRACTOR EMPLOYEES

The authority to grant commissary privileges to civilian employees of Government contractors in Alaska has been delegated to the major commanders concerned. Time did not permit obtaining from the major commanders the extent to which commissary privileges have been extended to these civilian employees.

Mr. WEAVER. Could I ask just one question. You mentioned Hawaii not being admitted officially as a State yet, but where does Hawaii stand in this respect right now?

Mr. LANHAM. When the acceptance procedure goes through, Hawaii will be in the United States. That would mean that the cost of goods sold in commissary stores in Hawaii would have to include the cost of transportation in Hawaii.

Mr. WEAVER. But it does not include that now.

Mr. LANHAM. That is correct.

Mr. FORD. Have you any idea how much this differential to Hawaii and/or Alaska costs the Treasury?

Mr. LANHAM. No, sir.

Mr. FORD. It could be easily obtained, I should think. Will you get it for the record?

Mr. LANHAM. I think we could get a rough estimate, sir. I am not sure we could get any detail.

(The information requested follows:)

The cost of transporting goods within Hawaii and Alaska for sale in commissary stores is estimated at $93,000 and $41,000, respectively, for fiscal year 1958.

Mr. FORD. Will you supply similar information as to the cost of shipping goods to Hawaii and Alaska?

Mr. LANMAN. We will furnish that information.

(The information will be furnished to the committee.)

CIVILIAN EMPLOYEE CEILING

Mr. LANMAN. I spoke of the technical amendment to insure that the full-time graded civilian employee ceiling is applicable to the Department of Defense. This results only because of the changes in title numbers of the bill, sir.

Mr. MAHON. All right.

How many full-time employees do we have now?

Mr. LANMAN. I do not know exactly, sir. I know we are well under that ceiling.

General MOORE. We can insert that. It is already inserted in the highlight book.

Mr. MAHON. All right, the next item.

Mr. FORD. It is my recollection that in years gone by the Department has recommended the deletion of this provision, 614.

Mr. LANMAN. The graded ceiling.

Mr. FORD. Yes.

Mr. LANMAN. Yes, sir. We have not done so for the last few years.

Mr. FORD. The testimony I recall was to the effect that it took a

lot of time and added some costs and created many problems. Is that still the feeling?

Mr. LANMAN. Each limitation, sir, costs money to administer. I believe a system for the administration of this one has been developed which is adequate, but as a matter of principle the administration of any limitation is expensive.

Mr. FORD. Did you say that the full-time graded civilian employees in total are below the 470,000 by some sizable figure?

Mr. LANMAN. I said well below. I did not mean to indicate that it was a sizable figure, but simply there was no doubt about the fact that we were complying with the law, and by a substantial margin.

Mr. FORD. I always thought it a useless provision, and I am still of that opinion.

(Off the record.)

Mr. FORD. That is the way I feel about it, and I think it ought to be deleted.

General MOORE. If I may, I would just as soon put it on the record.

Mr. LANMAN. On the general principle that we find these limitations very expensive to administer and often find, as I believe some witnesses have previously testified, that costs sometimes are hardly justified by the results.

Mr. FORD. I agree with you, and I wish you had recommended that it be deleted.

(Off the record.)

Mr. TRACY. We have had complaints from the research and development people about this section, now that you bring it up.

Mr. FORD. They think it interferes with the R. & D. program?

Mr. TRACY. They go out and hire a consultant. If they hire a consultant for 1 hour of 1 day, that takes up one space for the whole month, the way this is written, and they feel that definitely prevents their employing them.

General FRIEDMAN. I would certainly concur in the deletion of this section.

Mr. FORD. What problems does it cause you, General Friedman?

General FRIEDMAN. Sir, it is difficult to administer a program for which you have limitations within limitations. We have a very close control from the dollar standpoint and from an authorization voucher standpoint without having the additional administrative limitation within the overall manpower figure. As Mr. Lanman has said, each time you put on this type of limitation, it is just an additional burden.

Mr. FLOOD. It is bad law. Limitation based upon limitation is the worst kind of law.

(Off the record.)

PUBLIC INFORMATION ACTIVITIES

Mr. LANMAN. It just happens that the next provision relates to another limitation having to do with public information.

Mr. FORD. We had an expert witness up a little while ago to talk about that.

Mr. LANMAN. Yes, our expert on limitations. That is at page 190, section 619. Testimony was offered at a full hearing here on that subject, and I believe as well on sections 632, at page 195, which relates to the limitation on legislative activity.

Mr. MAHON. What is the estimate of the fund requirements for fiscal 1960 for public information and public relations?

Mr. LANMAN. I believe that was developed during the course of the hearings earlier, Mr. Chairman. I do not have that.

General MOORE. If we may, we will reinsert both amounts at this place in the record.

(The information requested follows:)

Department of Defense—Summary of public information activities, fiscal year 1960

Department, agency	Average number civilian employees	Total salary	Average number military personnel	Pay and allowances	Other costs	Total cost
Departmental:						
Army	12.0	$53,392	13.7	$121,523	$27,166	$202,081
Navy	2.2	8,576	12.2	85,998	15,341	109,915
Air Force	2.0	10,900	1.6	25,000	29,100	65,000
Office of the Secretary of Defense	39.0	353,100	21.0	187,945	64,700	605,745
Subtotal	55.2	425,968	48.5	420,466	136,307	982,741
Field—Zone of Interior:						
Army [1]	21.3	103,894	31.7	176,813	34,808	315,515
Navy	16.2	61,154	64.5	309,671	57,475	428,300
Air Force	22.1	99,600	65.7	298,850	55,050	453,500
Subtotal	59.6	264,648	161.9	785,334	147,333	1,197,315
Field—Overseas:						
Army	7.5	26,966	19.0	104,354	11,304	142,624
Navy	.8	3,400	24.6	148,023	5,054	156,477
Air Force	4.2	14,300	15.8	70,200	3,000	87,500
Subtotal	12.5	44,666	59.4	322,577	19,358	386,601
Summary—All commands:						
Army	40.8	184,252	64.4	402,690	73,278	660,220
Navy	19.2	73,130	101.3	543,692	77,870	694,692
Air Force	28.3	124,800	83.1	394,050	87,150	606,000
Office of the Secretary of Defense	39.0	353,100	21.0	187,945	64,700	605,745
Total	127.3	735,282	269.8	1,528,377	302,998	2,566,657

[1] Includes class II activities.

Department of Defense—Summary of legislative activities, by agency, fiscal years 1958, 1959, and 1960

	Fiscal year 1958				Fiscal year 1959				Fiscal year 1960			
	Civilian	Military	Total	Amount [1]	Civilian	Military	Total	Amount [1]	Civilian	Military	Total	Amount [1]
Army:												
Liaison	28	19	47	$353,601	19	16	35	$290,336	16	16	32	$286,816
Other legislative affairs	33	15	48	372,080	36	16	52	416,054	43	19	62	503,184
Total	61	34	95	725,681	55	32	87	706,390	59	35	94	790,000
Navy:												
Liaison	12	29	41	328,210	5	24	29	258,600	5	24	29	258,600
Other legislative affairs	30	16	46	286,339	29	22	51	337,641	29	24	53	349,341
Total	42	45	87	614,549	34	46	80	596,241	34	48	82	607,941
Air Force:												
Liaison	42	38	80	623,865	30	32	62	516,108	30	32	62	519,544
Other legislative affairs	64	23	87	679,071	62	23	85	655,799	62	23	85	696,586
Total	106	61	167	1,302,936	92	55	147	1,171,907	92	55	147	1,216,130
Office of the Secretary of Defense:												
Liaison	7	5	12	100,107	9	7	16	141,155	14	13	27	251,450
Other legislative affairs				26,448		1	1	30,695	2	2	4	56,750
Total	7	5	12	126,555	9	8	17	171,850	16	15	31	308,200
Summary:												
Liaison	89	91	180	1,405,783	63	79	142	1,206,199	65	85	150	1,316,410
Other legislative affairs	127	54	181	1,363,938	127	62	189	1,440,189	136	68	204	1,605,861
Total	216	145	361	[3] 2,769,721	190	141	331	[3] 2,646,388	201	153	354	[3] 2,922,271

[1] Includes civilian salaries, military pay and allowances, and other costs such as stationery, telephones, etc.

[2] Includes civilian pay increases for approximately 6 months and military pay increase for 1 month.

[3] Includes civilian and military pay increases for 12 months.

Payment of Claims

Mr. Lanman. We are at page 195, sir, section 633, recommended for deletion since by its terms it is permanent law.

Section 633, which relates to the payment of claims for certain retroactive benefits that were authorized pursuant to Public Law 85–255 of September 2, 1957. The language is permanent law and should be deleted from this bill on that basis.

Procurement of Commercial Air Transportation Service

Mr. Lanman. The last recommendation it is understood has been thoroughly discussed with representatives of the Air Force, including the Secretary and the Assistant Secretaries, and is a recommendation for the deletion of section 634, relating to the floor on the amount available for procurement of commercial air transportation service.

Mr. Flood. What is this? You are striking out this limitation?

Mr. Lanman. That is the request.

Mr. Flood. I have news for you. I have an amendment in my pocket to increase it when we get to the right place.

Mr. Mahon. This is a matter which will be discussed in executive session.

Mr. Flood. This is controversial, if I may understate the case.

Mr. Lanman. The earlier witnesses——

Mr. Flood. Suspect that, yes. If I don't have the help to do it, I have friends in the other body who advises me that they are prepared to do it.

Mr. Lanman. Mr. Chairman, that concludes the presentation of the general provision language changes. There are, of course, in the titles of the bill numerous other changes which we could discuss in detail at your convenience.

(Off the record.)

Recommended Bill Language Changes

Mr. Lanman. In line with the changed budget format and the the changes in appropriation structure proposed for fiscal year 1960, which were made to facilitate presentation and consideration of the Department of Defense budget on a functional and more uniform basis than in past years, we should like, with your approval, to discuss the recommended language changes in the order in which they appear in the bill.

As has been previously testified, none of these changes, either in this or in subsequent titles, gives the Secretary of Defense any greater or lesser authority over the utilization of appropriations for military functions administered by the Department of Defense than he now has, and the language changes which are recommended in the President's budget for these appropriations are primarily for the purpose of accommodating the changes in budget structure and providing greater uniformity. They are not intended to enlarge any of the authority of the existing language.

There are, however, some changes in the content of the individual appropriations.

RESEARCH, DEVELOPMENT, TEST, AND EVALUATION

First, one of the improvements urged by the committee has been adopted, namely, to differentiate more clearly between procurement on the one hand, and research, development, test, and evaluation on the other. For the most part the changes to accomplish this result represent decreases in the estimates for the procurement type appropriations and corresponding increases in estimates for the more comprehensive research, development, test and evaluation appropriations. To the extent that amounts associated with development, test, and evaluation remain in the procurement appropriations, they are being identified as separate budget activities.

(Off the record.)

Mr. MAHON. General Traub, what generally are the views of the Army with respect to this problem?

General TRAUB. Sir, I have set those forth in the record in detail in the past.

Mr. MAHON. Make reference at this point to the places where those statements appear in our previous record. You have made a presentation and we have had presentations from the Navy and from the Air Force. Let us put the citations, at least, in the record at this point.

(The information requested follows:)

The statements in question are on pages 141–143 of part 2 of the printed hearings.

General TRAUB. There is one additional facet of the matter which I will cover very briefly which has arisen since the transfer has been made.

In placing both of these appropriations in a straitjacket, as will apparently be the case, there will be less chance to employ flexibility as we have in the past. For example, in the past, the R. & D. appropriation might start out with an objective or an estimate that it would obtain so much, say $100 million, from PEMA for its support. That figure would grow during the year. And how would it grow? By determining at any particular time whether or not a new R. & D. project had greater value and greater merit than lower priority projects in the PEMA appropriation. If that were the case, then the money would be spent on the R. & D. project.

We think now this flexibility will no longer be present. In other words, the flexibility that was there to support the best projects in either appropriation will be lost.

CONSOLIDATION OF APPROPRIATIONS

Mr. FLOOD. Before you leave this, and on the record, with reference to the first statement made by the witness in reply to your question on the new budget structure, we began these hearings in January, and now we close them, and I want to repeat this for the purpose of emphasis at the end of the hearing on the question of the new budget structure concept.

Now that we finish the year of hearings, there are obviously elements of some advantage to this. Whether they are completely more desirable remains to be seen. However, I would like to make it clear as far as I am concerned that this is not to be considered by the Department of Defense, those who think this way, that you are getting the nose under the tent insofar as lump sum appropriations are con-

cerned, for the Secretary of Defense for anything, including remodeling his bathroom. That is out. We are not thinking that way and you have not changed it.

I know that up until Christmas night there are people down there, Secretary Quarles and others, who thought this budget should come up here with only half a dozen headings and that the money should be dumped into half a dozen headings and that would be the best way to do it. I don't think so, and I don't think this committee or the Congress thinks so. So, for the purpose of emphasis I repeat, regardless of what values we think this structure may have shown for the purpose of administering the hearing, under no circumstances are you to consider it an invitation even to think about lump sum budget appropriations for the Secretary of Defense.

Mr. LANMAN. Mr. Chairman, if I may, I think Secretary McElroy and Secretary McNeil both have indicated in previous testimony that they had no plans for moving any further along the lines discussed.

Mr. FLOOD. This is merely out of an abundance of caution.

Mr. MAHON. Proceed.

Mr. LANMAN. Second, another important change is the consolidation of 10 Navy operation and maintenance appropriations into a single new account. This change will place the operation and maintenance appropriations of the Navy on the same basis and give the Navy the same flexibility that the Army and Air Force have had for the past several years.

Third, as a logical result of this functional approach, separate appropriations for the civilian components, consistent with the new arrangements, are proposed.

Fourth is the establishment of three procurement appropriations in the Air Force—Aircraft Procurement, Missile Procurement, and Other Procurement—in place of the existing two. The principal result achieved by this change would be to include in any one of these appropriation accounts the funds for all major hardware related to any specific weapons system. For example, funds for launchers and ground handling equipment for missiles will be in the same appropriation as the missiles themselves.

OFFICE OF PUBLIC AFFAIRS

Fifth, inasmuch as the Office of Public Affairs is an integral part of the Office of the Secretary of Defense, it is proposed that the separate account for this Office be discontinued and the activities previously financed thereunder be merged with the appropriation Salaries and Expenses, Secretary of Defense, under the heading Operation and Maintenance.

Mr. FLOOD. At that point, Mr. Chairman, that is again one of our great controversial problems which we shall go into later on. We have just spent a lot of time explaining why in R. & D. we wanted a division to prevent anything of great controversial consequence from being hidden. Here you are going to take the moneys for the Office of Information down there and dump them into the Office of the Secretary of Defense, where they will lose all trace of their identity. If there ever was an office in any department of the Government of the United States where the identity of a line item should not be lost, it should be in the appropriation to Mr. Snyder's office.

Mr. LANMAN. The amount involved in that appropriation is relatively small.

Mr. FLOOD. Dollars has no relation to my point. Maybe there should be more.

Mr. LANMAN. About $450,000.

Mr. FLOOD. Maybe it should be twice that much. I don't know, but I want to see it on its own feet.

Mr. MAHON. We can undertake to evaluate that in our executive meeting.

Will you proceed.

Mr. LANMAN. Title I of the bill covers all appropriations for both Regular and Reserve components and retired pay involving military personnel costs. The changes in language which will be discussed in detail by each of the military departmental representatives are made to provide uniformity or to aline the appropriation with the functional budget category.

Mr. Robert L. Tracy, legal adviser to the Comptroller of the Department of the Army, Mr. Lawrence E. Chermak, counsel to the Navy Comptroller, and Mr. Arthur D. Holzman, assistant general counsel (Financial Management), Air Force, are present and prepared to discuss the details of the language changes in the appropriations for each of their departments.

The Military Personnel appropriation for the Army is at page 4 of the committee print.

(Off the record.)

MILITARY PERSONNEL, ARMY

Mr. TRACY. On page 4 under Military Personnel, Army, the changes are all editorial in nature. They do not change the coverage of the appropriation at all.

The phrase "expenses of temporary duty travel between permanent duty stations" is intended to cover only that temporary duty travel which is directly related to, and an integral part of, permanent changes of station. Some specific examples are: periods of delay at points of embarkation and debarkation; processing and medical examinations; short periods not over 7 days for briefing purposes or special instructions relative to new assignments. Other types of temporary duty travel will be charged to the appropriation financing the program concerned.

The language at the bottom of the page has been transferred to section 607 of the General Provisions.

The Navy Personnel account appears on page 8. Mr. Chermak will discuss it.

Mr. CHERMAK. The changes contained in this appropriation parallel somewhat the changes in the Army appropriation. There are actually three primary changes.

"Clothing" is stricken and "individual clothing" is substituted because it makes it clear that it covers individual uniforms.

The surplus language in brackets has been taken out since it is covered generally by the language which is already present as supported by the subsequent legislation.

At the bottom of the page, "Expenses of apprehensions of deserters" merely inserts this and parallels similar language in the Army and the Air Force.

In the Marine Corps, on page 11, the changes made there are identical with changes just explained in the Navy on page 8.

Mr. Holzman will explain "Military personnel, Air Force," on page 14.

Mr. HOLZMAN. The changes in this appropriation are likewise not substantive, and mostly editorial.

In line 4 on page 14 to line 3 on page 15, we have eliminated outdated and unneeded provisions carried over from Army language prior to fiscal year 1950. For example, rental of camp sites and other expenses incident to troop movements.

Then on page 15 we have inserted language with respect to expenses of temporary duty travel between permanent duty stations, similar to that of the Army.

Then the wording bracketed out at the end of page 15 has been transferred to section 607 of the general provisions.

The next appropriation is "Reserve personnel, Army," on page 18 of the committee print.

RESERVE PERSONNEL, ARMY

Mr. TRACY. The "Reserve personnel, Army," account again contains editorial changes which are intended only to make the wording of this appropriation uniform with that of the Navy and the Air Force. There are no substantive changes at all.

The proviso relating to minimum strength for 1959 has been deleted as having been carried out.

The next Reserve account appears at page 21.

Mr. CHERMAK. Our change in "Reserve personnel, Navy," parallels the changes made by the Army. "As authorized by law" we shifted to the bottom of the page for better language, and "related expenses" clarifies the scope of the head and includes all Reserve personnel costs authorized by law but not specifically identified in the language. There is no change in substance under this heading.

Marine Corps Reserve has similar changes as were made in "Reserve personnel, Navy." Those relate to "related expenses" and shift of language "as authorized by law."

The next page, Air Force Reserve, Mr. Holzman will discuss.

Mr. HOLZMAN. "Reserve personnel, Air Force." The actual coverage of this appropriation is identical to that provided by the language in prior years. The changes are primarily rearrangement of existing language. The new phrase "and related expenses" on line 2 of page 27 clarifies the scope of this head, including all Reserve personnel costs authorized by law.

The next appropriation is National Guard personnel, on page 31, and Mr. Tracy will explain that.

ARMY NATIONAL GUARD

Mr. TRACY. The changes on page 31 again are entirely editorial, made for the purpose of achieving uniformity with the Air Force National Guard appropriation.

The wording in the lower half of page 31 has been transferred to the new appropriation, Operation and Maintenance of the Army National Guard.

On page 32 the changes in the first proviso were made merely to reflect the transfer of funds to "Operation and maintenance, Army

National Guard." The words "United States and Hawaii" are inserted in there in relation to antiaircraft defense since those are the only places the National Guard operates.

The proviso relating to minimum strength of the National Guard has been deleted as having been carried out and as not applicable to fiscal year 1960.

Mr. FORD. May I ask, if the committee should decide to retain the existing budget structure for the Army National Guard or the Air National Guard, we should retain the language shown on pages 31 and 32 for both the personnel and the operation and maintenance costs for fiscal 1960?

Mr. TRACY. That would include both accounts, that is correct.

The next appropriation appears at page 34. Mr. Holzman will discuss it.

AIR NATIONAL GUARD

Mr. HOLZMAN. Primarily the language changes in this appropriation are designed to aline it with the established Department of Defense functional budget categories, and to provide for uniformity among the appropriations for the Department of Army and Air Force covering National Guard activities.

The bracketed phraseology removes coverage of major procurement and operation and maintenance from this appropriation. The funding authority for such activities is being transferred to "Other procurement, Air Force," and to "Operation and maintenance, Air National Guard."

The residual language provides for military personnel functions only, and the coverage is similar to that found in the appropriations "Military personnel, Air Force," and "Reserve personnel, Air Force," except for the type of military personnel involved.

Mr. FORD. May I ask one question, the same question I asked Mr. Tracy. If we retain the present budget structure for the Air National Guard, we should keep this language on pages 34 and 35 and lump the money together. Is that what should be done?

Mr. HOLZMAN. Yes.

General Friedman. There is one additional exception. You would have to move out the amounts for central procurement. There is a $19 million item to be taken out of "Other procurement" and put in with the other lumped amounts.

Mr. FORD. But still retain the language which is on pages 34 and 35.

General FRIEDMAN, That is right.

Mr. LANMAN. There would be some question about the construction.

General FRIEDMAN. Of course, last year the Air National Guard construction was part of the ANG appropriation, but was submitted separately as part of the regular military construction bill, was it not?

Mr. LANMAN. For the Guard.

General FRIEDMAN. Yes.

Mr. LANMAN. There is still some construction language in this deleted portion. It should be looked at, in other words, Mr. Ford.

Mr. FORD. Would you submit for the benefit of the committee the language which would take care of that situation which I have discussed?

(The information requested follows:)

CONSOLIDATED AIR NATIONAL GUARD APPROPPIATION ALTERNATIVE TO CURRENTLY PROPOSED AIR NATIONAL GUARD PERSONNEL AND OPERATION AND MAINTENANCE APPROPRIATIONS

AIR NATIONAL GUARD

For pay, allowances, clothing, subsistence, gratuities, travel, and related expenses for personnel of the Air National Guard on duty under sections 265, 8033, and 8496 of title 10, United States Code, or while undergoing training or while performing drills or equivalent duty, as authorized by law; operation and maintenance of the Air National Guard, including medical and hospital treatment and related expenses, establishment, maintenance, operation, repair, and other necessary expenses of facilities for the training and administration of the Air National Guard, including repair, maintenance, operation and modification of aircraft; transportation of things; purchase (not to exceed 42, of which 39 shall be for replacement only) and hire of passenger motor vehicles; supplies, materials, and equipment, as authorized by law for the Air National Guard of the several States, Territories, and the District of Columbia; and expenses incident to the maintenance and use of supplies, materials, and equipment, including such as may be furnished from stocks under the control of agencies of the Department of Defense; travel expenses (other than mileage) on the same basis as authorized by law for Air National Guard personnel on active Federal duty, of Air National Guard commanders while inspecting units in compliance with National Guard regulations when specifically authorized by the Chief, National Guard Bureau; $: *Provided*, That the number of caretakers authorized to be employed under the provisions of law (32 U.S.C. 709) may be such as is deemed necessary by the Secretary of the Air Force and such caretakers may be employed without regard to their military rank as members of the Air National Guard: *Provided further*, That obligations may be incurred under this appropriation without regard to section 107 of title 32, United States Code.

NOTE.—Should the above language be adopted it will also be necessary to make the following changes in the appropriation "Other procurement, Air Force":

(1) Change the passenger motor vehicles language on page 145 of the committee print to authorize purchase of not to exceed 2,535, of which 2,294 (including one at not to exceed $2,900) shall be for replacement only. This change is necessary since the figures now set forth on page 145 include National Guard requirements.

(2) Eliminate the language beginning "Provided further" at the bottom of page 145 of the committee print and continuing on through page 146. (In addition, funds totaling $18,870,000 requested under this appropriation for the Air National Guard should be included in the amount appropriated under the consolidated "Air National Guard" appropriation language set forth above.)

RETIRED PAY

Mr. HOLZMAN. The next appropriation is "Retired pay, Department of Defense," page 38 of the committee print.

Mr. LANMAN. There are no changes in that.

OPERATION AND MAINTENANCE, ARMY

Mr. TRACY. Under "Operation and maintenance, Army," on page 41, the word "trophies" has been inserted 10 lines down to indicate clearly that this appropriation may be used for that purpose. The type of trophy we have in mind is small trophies to be awarded for rifle and pistol championships, for outstanding ROTC, Reserve or National Guard units in a State, for outstanding records at service schools, and that type of thing.

Also on the same page, wording has been added to cover meals furnished under contract for selective service registrants called for induction and applicants for enlistment, because of a transfer of funds to this account from "Military personnel, Army," where they were previously budgeted.

At the top of page 42, wording relating to civilian clothing for discharged prisoners has been amended to increase the allowable cost from $30 to $40. The reason for this is that in the past a mixture of clothing consisting partly of a redyed military overcoat has been issued. The supply of these overcoats has now run out, and the cost of clothing in general has gone up. So the $30 limit is no longer adequate.

On page 43 the proviso relating to the operation of the Army-Navy Hospital at Hot Springs has been deleted. That has been covered.

The next account is on page 50, and Mr. Chermak will discuss the Navy operation and maintenance account.

OPERATION AND MAINTENANCE, NAVY

Mr. CHERMAK. The "Operation and maintenance, Navy" account is completely new. This establishes a new single operation and maintenance account for the Navy, and replaces 10 former operation and maintenance accounts, namely, Navy personnel general expenses, Marine Corps troops and facilities, aircraft and facilities, ships and facilities, ordnance and facilities, medical care, civil engineering——

Mr. MAHON. Is there anything basically different in this format from your authorization?

Mr. CHERMAK. This format is substantially the language we had before. I have prepared a table which indicates the origin of the language and its source from previous appropriations of the Navy. So you could go down with each phrase and see where it originated.

Mr. MAHON. We will put it in the record at this point.

OPERATION AND MAINTENANCE, NAVY; LANGUAGE SOURCE

Set forth below is the language for the new appropriation head "Operation and maintenance, Navy," indicating prior appropriation accounts and comparable language for the various items concerned. The footnotes after each item of expense are keyed to those in the committee print and the legal basis brochure for fiscal year 1960 which establish substantive authorities for the respective accounts.

For expenses, not otherwise provided for, necessary for the operation and maintenance of the Navy and the Marine Corps, including aircraft and vessels; [1]

Source: A & F "For expenses necessary for maintenance, operation * * * of aircraft * * *."

S & F "For expenses necessary for * * * maintenance and operation * * * of vessels * * *."

Modification of aircraft; [2]

Source: AF & F "For expenses necessary for * * * modification of aircraft * * *."

Design and alteration of vessels; [3]

Source: S & F "For expenses necessary for design * * * and alteration of vessels * * *."

Training and education of members of the Navy and the Marine Corps; [4]

Source: NPGE "For expenses necessary for general training, education * * * of Regular and Reserve personnel including tuition, cash book allowances * * * for each Naval Aviation College program student, and other costs incurred at civilian schools * * * facilities, including the Naval Academy, Naval Postgraduate School, Naval War College * * *."

MCT & F "* * * training and education of Regular and Reserve personnel, including tuition and other costs incurred at civilian schools * * *."

MC "* * * instruction of medical personnel in naval hospitals, naval schools, and civilian schools * * *."

Administration; [5]

Source: NPGE "For expenses necessary for * * * administration of Regular and Reserve personnel * * *."

Procurement of military personnel; [6]
Source: NPGE & MCT & F, identical language.
Purchase * * * and hire of passenger motor vehicles; [7]
Source: NPGE "* * * hire of motor vehicles * * *."
MCT & F "* * * hire of passenger motor vehicles * * *."
MC "* * * procurement of ambulances * * *."
CE "purchase * * * and hire of passenger motor vehicles * * *."
Not to exceed $40 per person for civilian clothing, including an overcoat when necessary, for enlisted personnel discharged for inaptitude, unsuitability, or otherwise than honorably; [8]
Source: NPGE and MCT & F, identical language except dollars increased from $30 to $40.
Welfare and recreation; [9]
Source: NPGE and MCF F, identical language.
Medals, awards, emblems and other insignia; [10]
Source: NPGE "* * * medals and other awards * * *."
MCT & F "* * * medals, awards, emblems and other insignia * * *."
Transportation of things (including transportation of household effects of civilian employees); [11]
Source: MCT & F "* * * transportation of things * * *."
SWS & F "* * * transportation of household effects of civilian employees * * *."
Industrial mobilization; [12]
Source: A & F & S & F F O, F & CE, and SWS & F, identical language.
Medical and dental care; [13]
Source: MC "For expenses necessary for maintenance and operation of naval hospitals, medical centers, clinics * * * and other medical activities * * *."
Care of the dead; [14]
Source: MC, identical language.
Lease of facilities; [15]
Source: A & F "* * * lease of air stations and facilities, testing laboratories, fleet and other aviation activities * * *."
S & F "* * * lease of facilities and docks * * *."
O & F "* * * lease of facilities * * *."
Latin-American cooperation; [16]
Source: SWON, identical language.
Charter and hire of vessels; [17]
Source: S & F, identical language.
Relief of vessels in distress; [18]
Source: S & F, identical language.
Maritime salvage services; [19]
Source: S & F, identical language.
Military communications facilities on merchant vessels; [20]
Source: S & F, identical language.
Dissemination of scientific information; administration of patents, trademarks, copyrights; [21]
Source: identical language was carried in the appropriation "Research, Navy" in fiscal year 1954 and prior years. This language was dropped in fiscal year 1955 when the head was broadened to "Research and development." The restatement of this language in the M & O account clarified the scope of "administration" as distinguished from procurement and research aspects.
Losses in exchange and in accounts of disbursing officers, as authorized by law; [22]
Source: SWS & F, identical language.
Annuity premiums and retirement benefits for civilian members of teaching services; [23]
Source: NPGE "* * * retirement benefits for civilian members of teaching staffs * * *."
Tuition, allowances, and fees incident to training of military personnel at civilian institutions; [24]
Source: NPGE "* * * For expenses necessary for general training, education * * * of Regular and Reserve personnel, including tuition, cash book allowances * * * for each Naval Aviation College program student, and other costs incurred at civilian schools * * *."
MCT & F "* * * training and education of regular and reserve personnel, including tuition and other costs incurred at civilian schools * * *."
MC "* * * instruction of medical personnel in * * * civilian schools * * *."

Repair of facilities;[25]

Source: NPGE "* * * maintenance * * * of Navy training and personnel facilities * * *."

MCT & F "* * * maintenance * * * of equipment and facilities * * *."

A & F "* * * maintenance * * * of air stations and facilities * * *."

S & F "* * * maintenance * * * of facilities * * *."

O & F "* * * maintenance * * * of ordnance facilities * * *."

MC "* * * maintenance * * * of naval hospitals, medical centers, clinics, schools, and other medical activities * * *."

CE "* * * maintenance * * * of district public works offices, public works centers, construction battalion centers, other civil engineering facilities, and shore activities not otherwise provided for * * *."

SWS & F "* * * maintenance * * * of servicewide supply and finance activities, including * * *."

SWON "* * * maintenance * * * of the Naval Observatory, the Hydrographic Office, servicewide communications * * *."

Departmental salaries;[26]

Source: NPGE, MCT & F, A & F, S & F, O & F, MC, CE, SWS & F, and SWON, identical language.

Utility services for buildings erected at private cost as authorized by law (10 USC 4778), and buildings on military reservations authorized by Navy regulations to be used for welfare and recreational purposes;[27]

Source: not carried in previous naval appropriations, however, this language is similar to that provided in O & M Army and Air Force.

Conduct of schoolrooms, service clubs, chapels, and other instructional, entertainment and welfare expenses for the enlisted men;[28]

Source: NPGE "* * * operation of Navy training and personnel facilities * * * welfare and recreation * * *."

MCT & F "* * * welfare and recreation * * *."

Cryptographic equipment;[29]

Source: SWON, identical language.

Procurement and production of services, special clothing, supplies and equipment for such purposes;[30]

Source: NPGE "* * * general training aids and devices."

MCT & F "* * * procurement and manufacture of military supplies, equipment and clothing * * *."

A & F "* * * procurement of services, supplies, special clothing, tools, materials, and equipment, including rescue boats * * * aerological services, supplies, and equipment for the Navy and Marine Corps * * *."

S & F "* * * procurement of equipment, supplies, special clothing and services * * *."

O & F "* * * procurement of equipment, supplies, special clothing and services * * *."

MC "* * * technical medical support of the supply system and other naval activities; procurement of * * * medical and dental supplies, equipment and services * * *."

CE "* * * procurement of services, supplies, and equipment * * *."

CE "* * * procurement of services, supplies and equipment * * *."

SWS & F "* * * procurement of supplies, services, special clothing, and equipment * * *."

SWON "* * * procurement of supplies, services and equipment * * *."

Procurement of plant equipment, appliances, and machine tools, and installation thereof in public or private plants;[31]

Source: A & F "* * * procurement of * * * tools * * *."

S & F, identical with language in the new account.

O & F "* * * procurement of plant equipment, appliances, and machine tools, and installation thereof in naval plants * * *."

Exploration, prospecting, conservation, development, use and operation of the naval petroleum reserves, as authorized by law;[32]

Source: Naval Pet. Res., identical language.

Not to exceed $_____ for emergency and extraordinary expenses * * *.[33]

Source SWON, identical language.

And support of the town of Olongapo, as authorized by law.[34]

Source: S & F "* * * Provided, That notwithstanding the availability of the trust fund 'Naval Reservation, Olongapo Civic Fund', this appropriation shall be available for such support of the town of Olongapo as may be authorized by law."

Of which $ ____ shall be transferred to the appropriation "Salaries and expenses", Weather Bureau, Department of Commerce, fiscal year 1960.

Source: A & F, identical language.

And $ ____ shall be transferred to the appropriation "Operating expenses", Coast Guard, fiscal year 1960, for the operation of ocean stations.

Source: S & F, identical language.

STATEMENT BY LAWRENCE E. CHERMAK, COUNSEL TO THE COMPTROLLER OF THE NAVY, EXPLAINING LANGUAGE CHANGES IN THE DEPARTMENT OF DEFENSE APPROPRIATION BILL, 1960, COVERING APPROPRIATIONS OF THE NAVY AND MARINE CORPS

There are 10 appropriations in the Department of Defense appropriation bill, 1960, which cover the requirements of the Navy and the Marine Corps. Of these appropriations, seven have language changes that require explanation and three, namely, "Aircraft and related procurement, Navy," "Shipbuilding and conversion, Navy," and "Procurement of ordnance and ammunition, Navy" have no language changes. The seven appropriation heads that have language changes will be taken up separately, with each change justified separately.

MILITARY PERSONNEL, NAVY

This appropriation appears on page 8 of the subcommittee print and has been changed to reflect the uniformity of structure contained in other military personnel appropriations. The structure, as changed, conforms with the budget category concepts prescribed within the Department of Defense. The changes made are not substantive in nature and result in getting rid of surplus language, as well as including language contained in the Army and Air Force appropriations.

On line 1 of this appropriation the words "individual clothing" have been inserted to replace the deleted word, "clothing," appearing on line 2. This new language makes it clear that the term covers the uniforms of the individual personnel.

On lines 3 and 4 a new phrase, "all expenses thereof for organization movements," has been inserted since this is an inherent element of permanent change of station travel.

The matter starting on line 5 and ending on line 14 has been deleted since much of it is surplusage. The transportation of dependents, household effects, including storage thereof, and privately owned automobiles is authorized by law and is related to the permanent duty station changes. Its inclusion in the appropriation language is not necessary. The language that relates to transfers from the Navy industrial fund and Navy stock fund relates to transfer action taken in 1959 and is not necessary in the 1960 bill.

The new language which appears in lines 15 and 16 is in substitution, in part, of the language deleted in lines 5 through 14. The language commencing on line 16 relating to the apprehension and delivery of deserters and prisoners parallels the language contained in the Army and Air Force appropriations and reflects the practice of all three military departments.

MILITARY PERSONNEL, MARINE CORPS

The language changes in this appropriation (p. 11) are identical to those contained in "Military personnel, Navy," except that no reference is made to midshipmen and aviation cadets since this is not a pay matter for the Marine Corps.

RESERVE PERSONNEL, NAVY

This appropriation appears on page 21 and contains four changes. The new phrase "and related expenses" clarifies the scope of this head, which includes all Reserve personnel costs authorized by law but not specifically identified in the language. This is not a substantive change. Reference to 10 U.S.C. 6908 has been deleted as superfluous, since the phrase "as authorized by law" limits all obligations under this head to authorized persons.

RESERVE PERSONNEL, MARINE CORPS

The changes made in this appropriation (p. 25) are identical to those made in "Reserve personnel, Navy," except that there was no need to delete reference to "10 U.S.C. 6908" as this citation was not made a part of this appropriation.

OPERATION AND MAINTENANCE, NAVY

This appropriation appears on pages 50, 51, and 52 of the subcommittee print and is a new appropriation in its entirety. The appropriation, as contained in the subcommittee print, clearly reflects the language of the former appropriations, except that the reference to "10 U.S.C. 4778" appearing on page 51 should be deleted (this is an Army reference). The language of this new appropriation is designed to cover the 10 former operation and maintenance accounts that it replaces. These former accounts are as follows: "Navy personnel, general expenses"; "Marine Corps troops and facilities"; "Aircraft and facilities"; "Ships and facilities"; "Ordnance and facilities"; "Medical care"; "Civil engineering"; "Servicewide supply and finance"; "Servicewide operations"; and "Naval petroleum reserves." A chart has been prepared showing the origin of the language contained in the new appropriation. For the most part, they have been derived from prior appropriation accounts of the Navy. In certain instances the language is the same as that contained in operation and maintenance accounts of the Army and the Air Force. In all instances substantive authority exists for the expenditure authorized. In no way has this appropriation been enlarged above the sum total of the authority previously contained in the 10 accounts which it replaces. Authority is contained in the appropriation to purchase for replacement only, 1,117 passenger motor vehicles; 10 of these motor vehicles are for cars not to exceed $2,900 each. These cars are to be used by fleet admirals and vice admirals having a fleet-type command.

PROCUREMENT, MARINE CORPS

This appropriation appears on page 136 of the subcommittee print. The title of this account was changed from "Marine Corps Procurement" to "Procurement, Marine Corps" to conform with other appropriation titles for the Department of Defense. Instead of acquiring 417 cars as provided in the 1959 appropriation, the Marine Corps only seeks to have authority to purchase 20 passenger motor vehicles for replacement only for the fiscal year 1960. The proper deletions and insertions reflecting this need have been made in the appropriation.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, NAVY

This head is broadened in scope to include test and evaluation previously charged to other accounts. The proviso authorizes the transfer into this head unexpended balances of funds heretofore made available for the same purposes as this account and to be administered under the authority of this head.

SEPARATION OF MARINE CORPS BUDGET FROM NAVY

Mr. FLOOD. You will recall during the hearings I raised the question about the separation of the Marines' budget from the Navy.

Mr. MAHON. Where would be the proper place to discuss the matter? Would it be here?

Mr. CHERMAK. This would be the place to discuss it.

Mr. MAHON. This is where the funds are provided.

Is there anything basically different from the overall pattern of the Navy, Army, and Air Force in the field of operation and maintenance?

Mr. CHERMAK. No, sir; except as our particular needs require. We have ships, and we have aircraft; we have a Marine Corps, but we parallel almost completely what they have in the language that we have. If you went through this, you would see that it is almost similar. In many instances we attempted to make the language the same.

There is one basic difference. In making the shift from these appropriations we did not take the trouble of taking out certain major procurement. For instance, the procurement of our motor vehicles is still in maintenance and operation. In the case of the Army they have it in the procurement account. That is true of the Air Force also. We have some other equipment that in the case of the Army and the Air Force would be in major procurement. We have not completed that shift, but generally the accounts tend to parallel each other.

Mr. MAHON. Would it be desirable to complete this shift?

Mr. CHERMAK. It would require a segregation of this particular money which might be a task at the present time. I think, in the evolution of a budget next year, we could accomplish this.

Mr. MAHON. Is it planned you will do that?

Mr. CHERMAK. It is expected we do that.

Mr. MAHON. Now, a representative of the Marines before this committee expressed great disappointment that the proposal was made throwing the Marine Corps sums in a lump sum with the Navy fund.

How can we be sure that the appropriations for the Marines would be held exclusively for the Marines?

Mr. CHERMAK. We have segregated these funds into subheads which clearly state what money is applied to the Marines; in fact, what money is applied to each of the particular bureaus, so that our subhead structure pretty much parallels the 10 appropriation heads that we had last year.

Mr. MAHON. It has to be admitted, I assume, that you could theoretically take all the operation and maintenance money for the Marines and apply it to the Regular Navy.

Mr. CHERMAK. The power to do that is here. We could take any money we have and within this appropriation apply it to any one of the enumerated purposes. We do not intend to do this. We intend to apply this as we justify it. Our records will indicate how much money we have applied to the particular items enumerated and our accounting is set up for the purpose of furnishing this information and showing whether or not we have so applied the money.

Mr. FLOOD. There is more to this than the facility of a bookkeeping operation. Now, the Marine Corps has resisted this kind of thing for years and years. While my friend says it is only in their theory, I understand that, but in practice there is something further. I developed this from an extremely reluctant Marine Corps general whom I could not get to talk except to snap his jaws and say yes. He was going to tell the chairman of the committee later on about what his objections were. I could not get what I wanted out of him. I have not talked to them since. I called two Marine Corps officers on the telephone and I could not get what I know is the fact because they do not feel that they are allowed to testify, or should testify. And they did not say that either. But I believe that this is ill-advised. I think it is against the best interests of the Marine Corps. I do not like it. I think that it should be removed and the operation kept distinct. I protest this very vehemently. It is not necessary or essential.

Mr. MAHON. Will you draw up language which will remove the Marine Corps from this and give them their former authority in operation and maintenance matters?

General MOORE. Could I propose language right now? After the amount you insert the words "of which $_____ shall be available solely for the maintenance and operation of the Marine Corps."

Mr. FLOOD. Is that what I want?

General MOORE. Off the record.

(Discussion off the record.)

Mr. MAHON. You may proceed.

OPERATION AND MAINTENANCE, AIR FORCE

Mr. CHERMAK. The next account is on page 59, "Operation and maintenance, Air Force," and Mr. Holzman will address himself to that.

Mr. HOLZMAN. We have inserted in this appropriation the words "and missiles" and we have juxtaposed the position of the word "maintenance" to more clearly reflect the scope of the activities covered by the appropriation. We have also made the change from $30 to $40, which was explained by Mr. Tracy; and on page 60, line 6, we have made a revision to make the language comparable to that for the Departments of the Army and the Navy and to eliminate an obsolete citation which we will explain in more detail in our detailed statement.

The next appropriation is "Operation and maintenance, Army National Guard," on page 67 of the committee print, and Mr. Tracy will explain that.

Mr. TRACY. The wording on page 67 has simply been lifted from the old Army National Guard account and placed under this new heading with one exception; that is, the old wording authorized alteration of structures and facilities, whereas the new wording covers only repairs and contains a new proviso at the top of page 68 authorizing up to $10,000 per project for extension, modification, or alteration of armory facilities.

The second proviso on page 68 is simply to permit simplified bookkeeping for the amounts previously appropriated for operation and maintenance of the Army National Guard.

Mr. FORD. This new proviso gives you some authority that you did not have heretofore?

Mr. TRACY. It permits the extension of armory facilities; yes.

Mr. FORD. And these are armory facilities which are paid for in part by contributions by the State and local communities?

Mr. TRACY. That is correct.

Mr. FORD. And under this proviso there is no provision for such a contribution by them?

Mr. TRACY. No. These would be costs that would result entirely from requirements of the Federal Government, such as a change from an infantry-type division to an armored-type division.

OPERATION AND MAINTENANCE, AIR NATIONAL GUARD

The next account appears at page 71 under the heading of the Air National Guard, operation and maintenance.

Mr. HOLZMAN. Mr. Chairman, this is a new appropriation proposed for the coverage of the operation and maintenance requirement of the Air National Guard. These requirements were previously provided for as a segment of the former appropriation, Air National Guard.

We will go into the detailed changes made in this appropriation in our detailed statement which we will present for the record. The detailed statement follows:

STATEMENT BY ARTHUR D. HOLZMAN, ASSISTANT GENERAL COUNSEL OF THE AIR FORCE, IN EXPLANATION OF PROPOSED AIR FORCE LANGUAGE CHANGES

MILITARY PERSONNEL, AIR FORCE

(P. 14 of the committee print)

The changes on page 14 of the committee print, under Military Personnel, Air Force, are designed to provide uniformity with similar appropriations for the other services, and to aline this appropriation with functional categories used within the Department of Defense. In general they make no substantive change in the coverage of this appropriation, and are editorial in nature.

The word "individual" (line 1, p. 14) is inserted to make the Air Force language uniform with that currently possessed by the Army and that proposed for the Navy in this appropriation bill.

The word "transportation" is deleted from line 2 on page 14 since the categories of "transportation" which are funded from the Military Personnel appropriation will be covered in the new language "permanent change of station travel (including all expenses thereof for organizational movements), expenses of temporary duty travel between permanent duty stations, for members of the Air Force on active duty (except those undergoing reserve training), cadets and aviation cadets * * *." Other "transportation" expenses are funded from the O. & M. appropriation.

The bracketed language on lines 2 and 3 on page 14 is deleted since it is covered by the quoted language set forth in the reason for deletion of the word "transportation" above.

The word "gratuities" is inserted on line 3 of page 14 to make it clear that such items as benefits authorized for survivors of members of the Air Force by title 10, United States Code, sections 1475–1480 are funded from this appropriation. Those provisions of title 10 authorize certain death gratuities. The Navy Military Personnel appropriation already contains such language, and the Department of Defense instruction establishing budget and accounting classifications for the military personnel appropriations (7220.3) prescribes that such "gratuities" shall be funded from the Military Personnel appropriation.

The bracketed language on lines 4 to 9 on page 14 is deleted since it is now covered by the words at the top of page 15 "for members of the Air Force on active duty (except those undergoing reserve training), cadets and aviation cadets * * *."

The bracketed language on lines 9 to 11 is deleted since it is covered by the general terms "allowances, individual clothing, and subsistence" set forth above in the appropriation.

The language on lines 12 to 16 dealing with rental of campsites, local procurement of utility services, and other expenses incident to individual or troop movements is deleted since it is covered by the language authorizing "travel (including all expenses thereof for organizational movements)".

The language on lines 16 to 20 dealing with ice and meals for recruiting parties, coffee for troops, commutation of rations, etc., is deleted as redundant or obsolete and unnecessary. Insofar as specific authority is necessary it is included in the proposed section 607 of the general provisions (see 607(c) subsistence for applicants for enlistment). These items are identified for funding from this appropriation by the general term "subsistence" on line 1 of page 14.

The language on lines 20 to 22 dealing with transportation of dependents, baggage and household effects (including storage thereof) is deleted as unnecessary since it is covered by the general language referring to permanent change of station travel found on line 4 of page 14.

The language on lines 22 on page 14 to 3 on page 15, dealing with rations for prisoners, subsistence supplies for resale (covered by "subsistence"), commutation of rations to general prisoners while sick in hospitals, and subsistence of supernumeraries, is now covered insofar as necessary by the proposed section 607 of the general provisions, and is identified as funded from this appropriation by the term "subsistence" in line 1 of page 14.

The new language on page 15 starting with "(including all expenses thereof for organizational movements)" relates to travel (see discussion in connection with the deletion of the word "transportation" above). This language describes the travel funded from this appropriation, and makes it clear that contrary to the

general practice of paying TDY travel from O. & M., expenses of TDY between permanent duty stations (such as for briefing or special instructions) are funded from this appropriation.

The language on lines 5 to 7 of page 15 "for members of the Air Force on active duty (except those undergoing Reserve training), cadets and aviation cadets" makes it clear that expenses related to persons undergoing Reserve training are funded from the Reserve personnel or Air National Guard personnel appropriations.

The words "of the Air Force" on line 9 of page 15 are deleted as unnecessary.

The deleted provisions on lines 11 to 16 of page 15, dealing with confinement of military prisoners in nonmilitary facilities and donations upon release from prisons, are now covered in section 607 of the general provisions. The term "gratuities" on line 3 of page 14 identifies this appropriation as the one from which costs of such donations shall be paid.

At the bottom of page 15, there has been inserted language authorizing the transfer to this appropriation of $50 million from the Air Force stock fund, in addition to the amount appropriated.

RESERVE PERSONNEL, AIR FORCE

(P. 27 of the committee print)

The actual coverage of this appropriation is identical to that provided by the appropriation language for prior years. The changes made on page 27 are primarily a rearrangement of existing language to provide uniformity with similar appropriations for all the military services, and to align this appropriation with established Department of Defense functional budget categories.

The word "gratuities" on line 2 of page 27 is inserted to make it clear that this appropriation covers expenses such as survivors' benefits of personnel paid from this appropriation.

The phrase "and related expenses" on line 2 of page 27 is inserted to eliminate the necessity for the language bracketed on lines 7 to 9 of this appropriation, dealing with procurement and issue of uniforms to institutions necessary for the training of the Air Reserve Officers' Training Corps. It also makes it clear that this appropriation covers all Reserve personnel costs authorized by law but not specifically identified in the appropriation language. Finally, it makes the Air Force language uniform with that currently used in the Army Reserve personnel appropriation and proposed for insertion in the Navy appropriation.

The words "and the Air Reserve Officers' Training Corps, while" on lines 3 and 4 are deleted and inserted on lines 5 and 6, subsequent to the language relating to Reserve training drills or equivalent duty. There is no substantive change involved. The language as proposed is in conformity with that of the Army and Navy.

NATIONAL GUARD PERSONNEL, AIR FORCE

(P. 34 of the committee print)

Primarily, the language changes in this appropriation (which is currently entitled "Air National Guard") are designed to align it with established Department of Defense functional budget categories, and to provide for uniformity among the appropriations of the Departments of the Army and the Air Force covering National Guard activities. In general, the bracketed phraseology removes coverage for major procurement, operation and maintenance, and military construction from this appropriation. The funding authority for such activities is being transferred to "Other Procurement, Air Force," "Operation and Maintenance, Air National Guard," and to "Military Construction, Air National Guard." Thus the residual language provides for military personnel functions only; and the coverage is similar to that found in the appropriations, "Military personnel, Air Force," and "Reserve personnel, Air Force," except for the type of military personnel involved.

The portion of the language deleted on lines 1 to 4 on page 34 dealing with transportation expenses is now covered by the word "travel" which has been proposed for insertion on line 4 in this appropriation. The language dealing with medical and hospital expenses is now being included in line 2 of the O. & M., Air National Guard appropriation.

The word "gratuities" is inserted on line 4 to make clear that such items as survivors' benefits related to National Guard personnel paid from this appropriation are funded under this head.

The word "travel" is inserted on line 4 to take the place of the transportation language deleted on lines 2 and 3, and covers all travel except unit inspection by commanders, which is to be paid from O. & M. Air National Guard.

The new language on line 5 is inserted to make clear that all personnel expenses authorized by law which are related to National Guard personnel are funded from this appropriation. It also provides uniformity with the other National Guard and Reserve personnel appropriations.

The language on lines 6 and 7 is deleted as unnecessary in view of the insertion on lines 9 and 10, immediately following, of the words "or while undergoing training or while performing drills or equivalent duty * * *."

The balance of this appropriation, beginning on line 10 of page 34, is deleted since the items covered therein are not "personnel" costs and will not be funded from this appropriation. The travel expenses of Air National Guard commanders inspecting units in compliance with National Guard regulations are now included in the O. & M., Air National Guard appropriation. Similarly, establishment, maintenance, operation, repair and other necessary expenses of facilities for training and administration of Air National Guard are now to be funded from O. & M., Air National Guard. The construction language previously included in the Air National Guard appropriation will this year be provided in a separate construction appropriation for the Air National Guard. The remainder of the appropriation language recommended for deletion is included in the O. & M., Air National Guard appropriation.

The proviso on page 35 at the end of the appropriation language, which authorizes incurrence of obligations under this appropriation without regard to section 107 of title 32, United States Code, is requested for insertion in order to provide authority similar to that possessed by the Army in this respect. Section 107 of title 32 provides that appropriations for the Air National Guard shall be apportioned among the States and Territories under equitable procedures to be prescribed by the Secretary of the Air Force, and in direct ratio to the respective actual strengths in enlisted members of the active Air National Guard in those jurisdictions at the date of apportionment. This requirement for apportionment of funds is not workable in view of the absence of a relationship between the number of enlisted personnel and the dollars needed to support combat readiness of flying units. That is, the military needs of particular units in the overall national defense are not necessarily related to the number of enlisted personnel in each State organization. A similar proviso is requested in the O. & M., Air National Guard appropriation.

OPERATION AND MAINTENANCE, AIR FORCE

(P. 59 of the committee print)

In this appropriation, the position of the word "maintenance" on line 4 has been changed, and the words "and missiles" have been inserted so that the revised clause reads, "operation, maintenance, and modification of aircraft and missiles." This change alines the word "operation" and the word "maintenance" in accordance with the title of the appropriation, and revises the language so that it more clearly reflects the scope of activities covered by the appropriation, by including the word "missiles".

On lines 2 and 3, the phrase "the activities of" is deleted as unnecessary.

On line 6, the words "and maintenance" are inserted in the phrase "repair of facilities" to make clear the fact that this appropriation not only funds costs of "repairing" facilities in the narrowest sense of that word, but also provides funds for work which will, to the maximum extent possible, obviate the necessity for "repairs". Insertion of the word "maintenance" here simply makes clear that the general language relating to maintenance at the beginning of the appropriation on line 2 also relates to facilities.

The change from $30 to $40 on line 19 is requested since it has been necessary, in order to keep within the $30 limitation, to provide inadequate clothing. The $30 figure was established in 1922, and adequate clothing can no longer be provided for that amount. A similar change in this amount has been requested by Army and Navy.

The deletion and insertion on lines 2 to 8 on page 60 are requested for the following reasons:

> 31 U.S.C. 95a authorizes relief, under certain circumstances from liability for losses of disbursing officers of the Air Force. 31 U.S.C. 492a–492c replaces 50 U.S.C. App. 1705–1707 and authorizes check cashing and exchange

transactions for official and accommodation purposes, and adjustment for account losses which may result therefrom. The words "exchange fees, and losses or deficiencies in the accounts of disbursing officers and their agents as authorized by law;" are substituted for that portion of the language beginning with "payment of exchange fees." and ending, "as authorized by law (31 U.S.C. 95a; 50 U.S.C. App. 1705–1707)". This revision will make the language comparable to that for the Departments of the Army and Navy, and will eliminate an obsolete citation. Additionally, it will eliminate any possible inference that citation of the laws is intended to limit the application of the language to those statutes. With respect to the proposed language, the word "deficiencies" has been included in order to be consistent with the language of 31 U.S.C. 492a–492c (which replaces the obsolete citation of 50 U.S.C. App. 1705–1707 mentioned above) and which contains provisions concerning the adjustment of deficiencies in accounts resulting from exchange transactions.

OPERATION AND MAINTENANCE, AIR NATIONAL GUARD

(P. 71 of the committee print)

This is a new appropriation proposed for coverage of the operation and maintenance requirements of the Air National Guard. These requirements were previously provided for as a segment of the former appropriation, "Air National Guard." The language is modified to provide for uniformity between the appropriations of the Departments of the Army and the Air Force covering National Guard activities, and to aline the appropriation structure with established Department of Defense functional budget categories.

The language of this appropriation up to the first proviso on line 20 of page 71 of the committee print is taken from the old Air National Guard appropriation, though slightly rearranged in the interests of uniformity with the Army O. & M. National Guard appropriation. It does not include language previously contained in the Air National Guard appropriation with respect to construction of facilities; such construction will now be funded from a separate construction appropriation.

At the end of the first proviso running from line 20 to 23, and dealing with the number of caretakers authorized to be employed, the Air Force is requesting that the following new language be inserted after the words "Secretary of the Air Force," namely, the phrase "and such caretakers may be employed without regard to their military rank as members of the Air National Guard." This insertion has been requested in a letter to the committee from the Assistant Secretary of the Air Force, Mr. Garlock, which notes that the Bureau of the Budget has approved the request for this insertion. Title 32, United States Code, section 709(d) provides that one commissioned officer of the National Guard, in a grade below major, may be employed for each squadron of the Air National Guard, and that commissioned officers may not otherwise be employed as caretakers or clerks. The proposed change in appropriation language is necessary in order to continue a long-established practice of employing majors and above as caretakers or clerks, without regard to the limitations of title 32, United States Code, section 709. This practice has been specifically authorized each year by the Army's appropriation language. However, through inadvertence, it has been omitted from Air Force appropriation language since 1949. The proposed change would provide authority for the Air Force such as is presently possessed by the Army, and would permit continuance of a long-established practice now in operation.

The second proviso, running from line 23 on page 71 to line 1 on page 72 of the committee print, which deals with incurrence of obligations without regard to section 107 of title 32, is identical to the proviso proposed for the National Guard personnel, Air Force appropriation, and is essential for the same reason, i.e., because modern military and preparedness needs do not necessarily bear a direct relationship to enlisted strength of the units in each State and Territory. Inclusion of this exemption will provide the Air Force with authority similar to that now possessed by the Department of the Army, and will enable appropriations to be apportioned among the States and Territories according to actual military need.

The last proviso, beginning on line 1 of page 72, and dealing with obligations certified under the 1958 and 1959 Air National Guard appropriations, is inserted to permit simplified accounting, and to obviate the necessity of maintaining

separate accounts under the old titles. The proposed language is comparable to that proposed for insertion in the Army operation and maintenance, National Guard appropriation.

AIRCRAFT PROCUREMENT, AIR FORCE

(P. 139 of the committee print)

The former Air Force appropriations entitled "Aircraft, missiles, and related procurement," and "Procurement other than aircraft and missiles," have been realigned into three new procurement appropriations: "Aircraft procurement"; "Missile procurement"; and "Other procurement." These changes are designed primarily to improve programing, management, and administration of funds appropriated for these purposes. Within the three new appropriations, changes in coverage have been made to aline these appropriations with established Department of Defense functional budget categories.

In addition to the realinement into three appropriations, there are changes in appropriation coverage, whereby a substantial protion of the amounts formerly included for development, test, and evaluation, has been shifted to a new appropriation for research, development, test, and evaluation.

The changes in these appropriations not only provide financing for the prime equipment items (e.g., aircraft, missiles) but also, in the same appropriations, provision is made for financing the specialized ground equipment needed to support the respective prime equipment items. In addition, language authorizing expansion of public and private plants substantially similar to that which has been included in past years in the "Aircraft, Missiles, and Related Procurement" appropriation is proposed for insertion in the fiscal year 1960 Appropriation Act in all three new procurement appropriations. It is intended that the same authority contained in the language used in the fiscal year 1959 "Aircraft, Missiles, and Related Procurement" appropriation, which authority covered the furnishing of facilities without regard to the particular appropriation which would fund the end items produced therein, shall exist in the language set forth for inclusion in each of the three new procurement appropriations. In other words, no substantive change in the overall coverage of the facilities expansion language is intended by virtue of the fact that it is proposed for inclusion in each procurement appropriation.

With respect to the "Aircraft Procurement" appropriation, provision has been made on lines 16 to 22 of the committee print, for merging with this appropriation such amounts of the unobligated balances of appropriations previously granted for "Aircraft, missiles, and related procurement," and "Procurement other than aircraft and missiles," as the Secretary of Defense may determine to be necessary for the accomplishment of the programs for which this appropriation is made. (The fiscal year 1959 and prior year programs will be liquidated under the former appropriation titles.) This merging will permit funding of new programs from one account, and will enable an earlier liquidation of amounts appropriated under the old appropriation than would be the case if new obligations were charged directly to the old appropriations in every case.

MISSILE PROCUREMENT, AIR FORCE

(P. 142 of the committee print)

The language of this appropriation corresponds to that set forth in the "Aircraft Procurement" appropriation, but covers procurement and development of missiles and their components, as well as specialized ground equipment in support of missile systems, and also related expenses such as industrial facilities and modification of inservice missiles and support equipment. In this appropriation also, provision has been made for merging with this appropriation such amounts of the unobligated balances of appropriations previously granted for "Aircraft, missiles, and related procurement," and "Procurement other than aircraft and missiles," as the Secretary of Defense may determine to be necessary for the accomplishment of the programs for which this appropriation is made. The fiscal year 1959 and prior year programs will be liquidated under the former appropriation titles.

OTHER PROCUREMENT, AIR FORCE

(P. 145 of the committee print)

In this appropriation, in addition to the realinement as one of three new appropriations, there are these changes in appropriation coverage:

A substantial portion of the amounts formerly included for development, test, and evaluation has been shifted to a new appropriation for research, development, test, and evaluation. Moreover, specialized ground equipment, needed to support aircraft and missiles, has been dropped from this appropriation, and is now covered in the appropriations for "Aircraft Procurement" and "Missile Procurement," respectively. Finally, the financing of major procurement for the Air National Guard, formerly covered in the appropriation "Air National Guard" and reimbursed to this appropriation, is now provided initially in this appropriation.

No provision is made for financing the 1960 program for the air navigation system known as Vortac. The Federal Aviation Agency is budgeting for these fiscal year 1960 requirements in accordance with responsibilities assigned to that agency by the "Federal Aviation Act of 1958," Public Law 85–726.

On lines 5 to 8 on page 145 of the committee print, wording relating to the purchange of motor vehicles has been revised to reflect the fiscal year 1960 budget program of 2,577 sedans, of which 2,333 (including one at not to exceed $2,900) shall be for replacement only.

At lines 17 to 23, provision has been made for merging with this appropriation such amounts of unobligated balances of appropriations previously granted for "Procurement other than aircraft and missiles" as the Secretary of Defense may determine to be necessary for the accomplishment of the programs for which this appropriation is made. The fiscal year 1959 and prior year programs will be liquidated under the former appropriation title.

At the end of this appropriation, provision has also been made that such amounts of the certified, unexpended balances of the appropriations "Air National Guard," 1958, and "Air National Guard," 1959, as may be determined by the Secretary of Defense to have been available for procurement activities shall be merged with this appropriation. The purpose of merging with this appropriation the obligated but unexpended balances of the fiscal year 1958 and fiscal year 1959 "Air National Guard" appropriations (as may be determined by the Secretary of Defense to have been made available for procurement activities) is to permit the Air Force to account in the future under one head for all National Guard procurement funds appropriated for items of the type which are now to be funded from this appropriation.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, AIR FORCE

(P. 169 of the committee print)

As is the case in the equivalent Army and Navy appropriations, the words "test, and evaluation" have been added to the title and text of this appropriation to indicate that the appropriation coverage will include, as it does and has heretofore, not only pure research and development but also the test and evaluation of the products thereof. Such test and evaluation have also been, and will continue to be performed in the procurement areas. Whether a decision has or has not been made to produce a given item for operational inventory will determine the source of funding. In the former instance, the appropriate procurement account will provide for development, test and evaluation. In the latter case, R. D. T. & E. will provide the funds.

The proviso on lines 5 to 9, requiring fullest practical use of existing facilities, has been deleted as inappropriate to this appropriation. Moreover, since it is standard practice in any event to make fullest use of existing facilities, this language is unnecessary.

The proviso added on lines 9 to 15 authorizes the transfer into this head of unexpended balances of funds heretofore made available for the same purposes as this amount, in order to obviate the necessity for separate accounting and funding under separate titles.

At the end of the first proviso, running from line 20 to 23, and dealing with the number of caretakers authorized to be employed, we are requesting the following new language be inserted after the words

"Secretary of the Air Force;" namely, the phrase, "and such caretakers may be employed without regard to their military rank as members of the Air National Guard."

This insertion is requested in a letter to the committee from the Assistant Secretary of the Air Force, Mr. Garlock, which notes that the Bureau of the Budget has approved the request for this insertion; 32 U.S.C. 709(d) provides that one commissioned officer of the National Guard in a grade below major may be employed for each squadron of the Air National Guard and that commissioned officers may not otherwise be employed as caretakers or clerks. This change in the appropriation language is necessary in order to continue a long-established practice of employment of majors or above as caretakers or clerks without regard to 32 U.S.C. 709(d). This practice has been specifically authorized each year by the Army's appropriation language; however, through inadvertence it has been omitted from the Air Force's appropriation language since 1949.

The proposed change would provide authority for the Air Force as presently possessed by the Army, and would permit continuance of a long-established practice now in operation.

Mr. FLOOD. What is the point? Are you trying to make a point? What is it?

Mr. HOLZMAN. To permit us to employ officers of the rank of major and above without limitation.

Mr. FLOOD. To permit you to do it?

Mr. HOLZMAN. Yes.

Mr. FLOOD. As civilians working there when not on active duty? They would be clerks in the office of the armory, majors and above?

Mr. HOLZMAN. Yes.

Mr. FLOOD. Is that good?

Mr. HOLZMAN. Yes, and we have been doing it.

General FRIEDMAN. I think it is good. I do not know why a man should be penalized from consideration for employment on the basis that his military rank—Reserve rank—is above that of a major.

Mr. FLOOD. I agree with that.

Mr. LANMAN. The legislation covering this has passed the House on at least one occasion, and is up again this year. The Armed Services Committee favored it, and brought it to the floor with a favorable report. We are going down that route. There is no controversy or opposition.

Mr. FLOOD. I have often wondered why greater advantage is not taken of this. I know of situations where in my district they are going to open a Marine Corps and an Air Force armory. Now, the Air Force, if they needed any personnel—and they do not—would get civilians from the civil service list. The Marines are going to try to use people they have. Is not there some way that we could increase this inducement? Is there not some way priority should be given to the enlisted personnel and officer personnel of a Reserve unit instead of giving these jobs to the civil service list? I am sure the Pennsylvania National Guard makes it a condition precedent to employment as caretakers at our National Guard armories they have to be members of the outfit. If these men are going to do all the good things we ask them to do, and we are going to open an armory and employ five people, why do not these fellows get the first shot at it if they are otherwise qualified? Why is not that the law? Why do you not take

care of your own people instead of opening up these desirable and lucrative jobs, within reason, to others in the community who do not have the interest in the service?

Mr. FORD. That is what you are doing with your technician program all across the board and all through the services.

Mr. FLOOD. Oh, yes. The department was quite proud of that justification last year. I would hope there would be no distinction between personnel because of rank, and you should give these men the right to jobs instead of passing them on to people who at the drop of a hat at 5 o'clock would be out of there.

NATIONAL BOARD FOR THE PROMOTION OF RIFLE PRACTICE

Mr. HOLZMAN. The next is the National Board for the Promotion of Rifle Practice, Army, page 74.

Mr. TRACY. The only change is to increase the incidental expenses to $3,000. This is to cover increased requirements for trophies and medals that they use in their programs.

ALASKA COMMUNICATIONS SYSTEM

On page 76, the Alaska Communications System, there is no substantive change whatever, merely technical changes or deletion of unnecessary language.

SALARIES AND EXPENSES, OFFICE OF THE SECRETARY OF DEFENSE

On page 78, Salaries and expenses, Office of the Secretary of Defense, Mr. Lanman will cover that.

Mr. LANMAN. To delete a reference to $3,000 automobiles since no funds are involved in this estimate to procure automobiles for replacement in excess of the basic dollar limitation; therefore the language is not necessary. There is no change in the claims appropriation, nor in the contingencies.

Language has been included at page 85 under "Operation and maintenance" of the Olympic winter games to cover the estimate for the expenses of the Olympic winter games as authorized by section 1 of the act of 1958, Public Law 85-365.

Mr. OSTERTAG. Is that new?

Mr. LANMAN. That is new language. The estimate has been presented. In the "Court of military appeals" there is no change.

PROCUREMENT OF EQUIPMENT AND MISSILES, ARMY

Mr. TRACY. The only change under the procurement of missiles and equipment is the insertion of the wording to authorize the purchase of 1,359 sedans, of which 20 are medium sedans at $2,900 each.

NAVY PROCUREMENT ACCOUNTS

The next is at page 136, the Navy procurement account.

Mr. CHERMAK. The three procurement accounts up to the Marine Corps procurement accounts have no changes in them. We went through those to the Marine Corps procurement.

The change in this is merely a change in title so that it conforms with all other appropriation titles and it now reads, "Procurement, Marine Corps" instead of "Marine Corps procurement."

The next appropriation is aircraft procurement.

AIR FORCE PROCUREMENT ACCOUNTS

Mr. HOLZMAN. The former Air Force appropriations entitled "Aircraft, missiles, and related procurement," and "Procurement other than aircraft and missiles," have been realined into three new procurement appropriations, "Aircraft procurement," "Missile procurement," and "Other procurement." This was explained to the subcommittee in Mr. Lanman's opening statement. This is the aircraft procurement appropriation, and in addition to the realinement, there are changes in appropriation coverage whereby a substantial portion of the amounts formerly included for development, test and evaluation have been shifted to a new appropriation for research, development, test and evaluation.

The next appropriation is missile procurement on page 142 of the committee print, and this language corresponds to that of the aircraft procurement appropriation, but covers the procurement and development of missiles and their components as well as the ground equipment and support of missile systems.

The next appropriation is "Other procurement" on page 145 of the committee print. This appropriation also represents a realinement of the former two procurement appropriations of the Air Force.

On lines 5 to 6, wording relating to the purchase of motor vehicles has been revised to reflect the budget program, for the fiscal year 1960, of 2,577 sedans of which one may cost up to $2,900.

CONSTRUCTION OF SHIPS, MSTS

The next appropriation is "Construction of ships, Military Sea Transportation Service, Department of Defense," page 157 of the committee print.

Mr. LANMAN. This language is necessary in order to wash out this account. It is indicated that the entire account is obligated, and we want to make sure the committee recognizes that as of June 30, 1959, that this account will be closed out.

Mr. FLOOD. How much will it cost us to close it out? Where are you going to hide that money?

Mr. LANMAN. This is a normal administrative action that is flowing right on through.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION ACCOUNTS

The Army research and development account is next, at page 162.

Mr. TRACY. Under the heading of "Research and development," the words "Test and evaluation" have been added to show the broadened scope of this appropriation. In addition, a proviso has been added which permits consolidation into this account of previous amounts appropriated for research purposes to prevent the necessity for separate accounting and funding under two different titles. This is purely a technical bookkeeping proposition.

The next account appears at page 166.

Mr. FLOOD. Before you go into that, would we not be interested in that figure? Would we not be interested in a statement showing what the amount was of unexpended balances for those appropriations? Would not this subcommittee be interested in such a figure?

Mr. TRACY. Yes. That figure will be available certainly at next year's hearing whenever the amounts are transferred. These are amounts that have already been appropriated and, in some cases, obligated. This simply covers the unexpended balances.

Mr. FLOOD. That is this new research, development, test and evaluation business?

Mr. TRACY. Yes.

Mr. FORD. I believe we have had charts put in the record.

General FRIEDMAN. A conversion chart.

Mr. TRACY. The actual amounts will be available next year.

Page 166 is the Navy research and development appropriation.

Mr. CHERMAK. The changes made in this appropriation are identical with the changes made in the Army appropriation and for the same reasons advanced by the Army.

The next appropriation is research and development, test and evaluation, Air Force.

Mr. HOLZMAN. With the exception of the proviso on lines 5 to 9, the changes made in this appropriation are identical to those in the Army and Navy appropriations, and for the same reasons.

The proviso on lines 5 to 9 requiring the fullest practical use of existing facilities has been deleted as inappropriate to this appropriation. Because it is standard practice in any event to attempt to make the fullest use of existing facilities, this language is unnecessary.

The next appropriation is "Salaries and expenses, Advance Research Projects Agency, Department of Defense," on page 173.

Mr. LANMAN. The changes are technical. In the "Emergency fund" there is no further change.

Mr. FLOOD. The committee will stand adjourned.

BUY AMERICAN WOOL PROVISION

WITNESS

HON. E. Y. BERRY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF SOUTH DAKOTA

Mr. MAHON. The committee will come to order.

Today we are to have witnesses who are not associated with the Defense Department.

Mr. Berry, of South Dakota, will be our first witness.

Mr. Berry, we are pleased to have you.

Why don't you just proceed in your own way.

Mr. BERRY. Thank you, Mr. Chairman. All I wanted to do was to make a pitch for the continuation of the buy American wool provision of the act which we have carried in our bill for 8 or 9 years providing that no woolen material should be purchased for the Defense Department other than that which is manufactured from domestic sources. This has been in the law for 6 or 8 years.

However, I noticed that in the budget there is a recommendation that that be deleted.

Mr. MAHON. General Moore, I believe you and I were discussing this matter some time ago. What is the general background on this legislation?

General MOORE. The provision has been in the bill with slight amendments from time to time for many years.

Recently, for the last 3 years, the administration has requested its deletion and suggested that the dependents be put on the basic Buy American Act.

The President in his budget message stated that:

> For the past several years the Defense Appropriation Act has contained a rider which limited competitive bidding by firms and other countries on certain military supply items. This restriction is sharply at variance with the general law popularly known as the Buy American Act. I strongly urge that the Congress not reenact this rider.

That has been the position of the administration for some 3 years now.

Mr. MAHON. Mr. Berry, we will have officials from the Defense Department testify before us with respect to the requested deletion of this language. We have had some problems with this heretofore.

So far as I can tell the language is all right and my disposition is to agree with you.

Mr. BERRY. Let me just add to that, Mr. Chairman, that we are paying a high subsidy to the woolgrowers of America in spite of the fact that the domestic production is only about one-third of the domestic consumption.

Mr. MAHON. That is right.

Mr. BERRY. So that actually what we are doing is subsidizing the woolgrowers of these other countries.

I think the least we can do in using tax money is to buy domestic produced woolen materials.

Mr. MAHON. Thank you very much.

Mr. BERRY. Thank you, Mr. Chairman.

Mr. MAHON. Mr. Berry, I am well aware of your very great interest through the years in the wool program and of your helpfulness to the committee. It is a pleasure to have your further views today and I want to thank you for your appearance.

ARMY MANPOWER

WITNESS

HON. J. W. TRIMBLE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ARKANSAS

Mr. MAHON. Now we have our good friend Jim Trimble, of Arkansas.

Mr. Trimble, we are always pleased to have you before the committee. We know of your very special interest in the problems of national defense and you have been always very alert and active in your work in national defense problems.

We will be glad to hear you at this time.

Mr. TRIMBLE. Mr. Chairman and members of the subcommittee, I appear today to urge the committee to appropriate funds and adopt language which will assure a base of at least 925,000 as a minimum for the ground troops.

Mr. Chairman, I make this request because of my deep conviction that our safety as a nation depends upon our ability to meet any aggressor in the air, on the sea, under the sea, and on the ground. Regardless of the kind of war—and we pray there will be no war, local, brush-fire, or general—terrain is still taken and held by ground forces.

Heretofore, we have had strong allies who were able to hold while we got ready. That is no longer true, and we find ourselves up front, with the great possibility that we will have less than 30 seconds' notice when the next one comes; and, therefore, no chance to train men and secure arms.

It is for this reason that I take the time of such busy men to urge continued strength of our ground troops.

Mr. MAHON. You have on previous occasions, in personal conversations and otherwise with members of the committee, expressed your great interest in having an adequate defense program. I know you have been very much concerned about the repeated reductions which have been made in our land forces.

I point this out: You also have been interested not only in the Army but in the other arms of the defense program.

I do not know what we will do about this problem. We are wrestling with it. The strength of the Army will be down on June 30, and that is not far off, to about 870,000 men.

Whether or not the committee or the Congress would want to provide the funds to raise that level back to where it was a few months ago is a question which we will have to seriously consider.

Mr. TRIMBLE. Yes, sir.

Mr. MAHON. Thank you very much.

Mr. FLOOD. Might I say, Mr. Chairman, that over a period of years this process of reducing the manpower of the Army has been going on. Either the gentleman from Florida, Mr. Sikes, or I, in the committee or on the floor, have proposed a series of amendments to restore those cuts, and in every case, Mr. Chairman, that I can remember during those years, when debates on such an amendment was before the House, the gentleman from Arkansas always came to me and indicated his interest and willingness to cooperate in any way to guarantee that the Army would not be damaged by such cuts.

Mr. MAHON. What reports do you get from Fort Chaffee?

Mr. TRIMBLE. Fort Chaffee is closing out unless there is a change in the order.

Mr. MAHON. To what extent has Fort Chaffee been closed?

Mr. TRIMBLE. The orders have gone out that it is to be closed by the first of June. They have orders that they must have that camp cleared out by the first of June.

Mr. MAHON. About how many military personnel are there now? Do you know?

Mr. TRIMBLE. The last time I checked there were 18,000. That was before the order came through.

(Discussion held off the record.)

Mr. MAHON. Thank you very much, Mr. Trimble.

National Guard Appropriations for 1960

WITNESS

MAJ. GEN. WILLIAM H. HARRISON, NATIONAL GUARD ASSOCIATION

Mr. Mahon. General, we are pleased to have you before the committee. I assume you want to talk with us with regard to National Guard problems.

Will you proceed?

General Harrison. Mr. Chairman and members of the committee, we appreciate the opportunity to appear before this committee in behalf of the 470,000 members of the National Guard during your consideration of the bill providing Federal appropriations for the support of the National Guard for fiscal 1960.

The introduction of the fiscal 1960 budget for the Armed Forces into the Congress gives serious alarm to the States, the members of the National Guard, and others interested in national defense. It is plainly evident that the Department of Defense continues to prepare almost exclusively for total nuclear war at the expense of those of our forces which might be maintained to contest lesser disturbances. In this respect, some of our leading military figures have publicly proclaimed that too large a portion of our military budget is devoted to the ultimate weapon leaving our conventional forces to become stepchildren on the road to oblivion. While we support without equivocation the concentration of our scientific abilities and efforts toward gaining and maintaining leadership in the development of nuclear devices and the means for their delivery we sincerely believe that the facts and experiences of international life demonstrate conclusively the need for a class of more conventional forces which have the capability of denying to the enemy his aggressive incursions among the many troubled spots of our world. The discredited policy of "massive retaliation" which was buried at Dien Bien Phu has been disinterred for the recent crisis in Berlin. Unless we have the national fortitude to initiate total nuclear war with all of its attendant horrors, and I for one, do not believe that we shall ever be the first to release that devastation, the current and projected trend of reductions in our Army, Navy and Marine Corps, Army National Guard, and Army Reserves provides only for the gradual dismemberment of the free world and commits the citizenry of the United States to reception of the initial nuclear bombardment.

We and others decry this trend to exclusive reliance on push-button devices. We are convinced that the Department of Defense can never be accused of preparing to fight the next war with the weapons of the last war. However, it is extremely likely that under this trend we may lose the next conflict or series of conflicts if "massive retaliation" is neither feasible or desirable.

The format and structure of the present budget is likewise alarming. Defense Department witnesses in their appearance before the Congress during hearings on the Department of Defense Reorganization Act of 1958 protested that they did not intend to set up a super General Staff in the Department nor exercise additional control over the administrative functions of the military departments. Why, then, the necessity for complete revision of the budget format, and why the

necessity for making appropriations directly to the Department of Defense? Certainly no more powerful control can be exercised than through the medium of money. This type of budget structure, if enacted into law, will provide the money managers in the Department of Defense with complete flexibility to circumvent Congressional intent. Indeed, its enactment would abrogate Congressional responsibility in this respect and give indirect legislative blessing to departmental fiat which Congress would never willingly surrender in any direct legislative proposal.

How does this affect the National Guard?

In the past, appropriations for the support of the Army National Guard and Air National Guard have been in two separate self-contained packages. Such a procedure was designed to provide efficient management, economy and execution of operating programs. This funding structure permitted the degree of flexibility to the National Guard Bureau required to accommodate program changes and adjustments. It permitted presentation to the Congress of a complete accounting against appropriated funds. It was a format which provided the Congress with direct information on what type of support the guard was receiving and allowed a measurement of performance. Moreover, it precluded funds appropriated for National Guard support from being diverted to projects of the Active Army and Air Force.

In the proposed budget the Army National Guard funding support is separated into two segments and lumped under Department of Defense funds. The Air National Guard funding support is separated into three segments and lumped with Department of Defense funds. Presentations concerning these segments are heard in bits and pieces with no clear opportunity to relate the complete funding support to requirements of the overall programs. Under this format the Department of Defense is provided complete flexibility to preempt National Guard funds in favor of programs deemed more desirable by the Regular components and to the detriment of the guard.

More specifically, and considering the Air National Guard first—

The Air National Guard proposed fiscal 1960 appropriation has been splintered into three separate segments. The action was accompanied by a transfer of responsibility for major procurement for the Air National Guard to the Air Force which removed $19 million from direct Air National Guard funding support and would permit that Department to divert the funds to other uses within the topical field of major procurement.

In order for the Congress to maintain a closer supervision over funding support of the Air National Guard it seems far wiser to incorporate a single Air National Guard appropriation as in the past. This may be accomplished as follows:

(1) Withdrawal of Air National Guard items from the separate headings in the proposed appropriation;

(2) Withdrawal of the $19 million major procurement item for the Air National Guard now contained in Air Force procurement;

(3) Totaling these items—$253 million; and

(4) Inserting a new section entitled "Air National Guard" utilizing the legislative format and language attached to this statement.

In respect to the Army National Guard—

The Army National Guard proposed fiscal 1960 appropriation is carried under two separate provisions. Moreover, it is deficient in funding support in three areas.

(1) Technician man-year support.

The budget requires a reduction of 403 Army National Guard technician man-years ($2 million) based upon the application of a Presidential order for a 2-percent reduction of civilian personnel in all Federal agencies. While the Department of Defense applied this to the technician program of the Army National Guard it is important to note that the technician requirement for the Air Defense NIKE program of the Army National Guard was exempt from this reduction. Actually, technician employment for this single program increases. Thus, the Presidential order has not been uniformly applied.

Since the organization of the Army National Guard subsequent to World War II the technician program has been maintained at a bare minimum support level. Technicians, with few exceptions, are members of guard units employed as civilians in their military assignment, engaged in day-to-day guard operations, and available for mobilization with their units. Past Federal directives reducing civilian personnel in Federal agencies have never been applied to this program. The number of technicians is set by the Congress in annual appropriation acts and we do not believe that it is the intent of the Congress that they be subject to Federal administrative directives applicable solely to Federal agencies.

(2) Subsistence for officers attending unit training assemblies of 8 or more hours duration in any 1 calendar day:

Multiple unit training assemblies of 8 or more hours duration performed in 1 calendar day require officers to be away from their residences on weekends during periods when they would normally partake of home meals. To require them to provide money for their own meals on such occasions serves as a penalty to the individuals concerned who are giving of their free time to build their units and increase their capabilities to defend their country. A simple change of language will permit these rations to be furnished.

(3) Four hundred thousand strength and 55,000 6-month trainees:

By far the most important omission in the proposed budget concerning the Army National Guard is the failure of the Department of Defense to include language which would maintain the Army National Guard at a strength of 400,000 during fiscal 1960, and provide for an input of 55,000 6-month trainees.

Last year in the Appropriation Act for fiscal 1959 the Congress saw fit to include language directing the Department of Defense to maintain Army National Guard strength at 400,000. Included in the appropriation were sufficient funds for 55,000 enlistees for the 6-month training program. This number of trainees had been determined to be the number required to maintain guard strength at the required 400,000. Nevertheless, the Department of Defense arbitrarily released funds for only 44,000 trainees withholding funds for the remaining 11,000 until late in the third quarter of the fiscal year. As a result of this action Army National Guard strength dropped during January of this year to approximately 390,000. Had the Department programed the full 55,000 trainees over the entire period so that the States could have properly spaced their recruiting efforts, in all probability guard strength would have remained in the neighborhood

of 400,000 throughout the fiscal year. It is hoped that with the late release of authority and funds to enlist the additional 11,000 6-month trainees that Army National Guard strength will attain and remain at the 400,000 congressionally directed figure by June 30 of this year.

The Army National Guard is currently in the throes of a directed reorganization under the Pentomic concept. The Department of the Army has announced that the reorganization is based upon a guard strength of 400,000. Any reduction in that number will result in a further reduction in the number of federally recognized units and many of the remaining units being maintained at unsatisfactory strength for training and maintenance purposes.

The reluctance of the Department of Defense in respect to supplemental moneys required to fund the Army National Guard program for the remainder of fiscal 1959 is indicative of the actions which will take place if the Department is given free reign to direct the guard as it may desire. Accordingly, we urge that the Congress again stabilize the strength of the Army National Guard at the 400,000 figure with appropriate language and that additional language be included which will direct the Department of Defense to program and fund the 55,000 6-month trainees required to maintain that strength.

In order to accomplish the foregoing we recommend—

(1) Withdrawal of Army National Guard items from the separate heading in the proposed appropriation;

(2) Inclusion of the $2 million with appropriate language modification required for technician support;

(3) Inclusion of money required to support 400,000 strength and 55,000 6-month trainees, $46 million:

(4) Totaling these items, $386 million; and

(5) Inserting a new section entitled "Army National Guard" utilizing the legislative format and language attached to this statement.

Mr. Chairman, we deeply appreciate the past actions of the committee in support of the National Guard and sincerely urge your continuing assistance and support now and in the future to the end that the National Guard may continue to be an effective, capable, and reliable force prepared to defend America against the enemies of freedom.

(The following statements were submitted for the record:)

AIR NATIONAL GUARD

For pay, allowances, clothing, subsistence, transportation (including mileage, actual and necessary expenses, or per diem in lieu thereof), medical and hospital treatment and related expenses for members of the Air National Guard while undergoing Reserve training or while performing drills or equivalent duty, including officers on duty under sections 265, 8033, and 8496 of title 10, United States Code, as authorized by law; travel expenses (other than mileage) on the same basis as authorized by law for Air National Guard personnel on active Federal duty, of Air National Guard commanders while inspecting units in compliance with National Guard regulations when specifically authorized by the Chief, National Guard Bureau; establishment, maintenance, operation, repair, and other necessary expenses of facilities for the training and administration of the Air National Guard, including construction of facilities, and additions, extensions, alterations, improvements, and rehabilitation of existing facilities, initiated in prior fiscal years; maintenance, operation, and modification of aircraft; transportation of things; purchase (not to exceed 42 passenger motor vehicles of which 39 shall be for replacement only) and hire of passenger motor vehicles;

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procurement and issue to the Air National Guard of the several States, Territories, and the District of Columbia of supplies, materials, and equipment, as authorized by law; and expenses incident to the maintenance and use of supplies, materials, and equipment, including such as may be furnished from stocks under the control of agencies of the Department of Defense; $235,870,000: *Provided*, That the number of caretakers authorized to be employed under the provisions of law (32 U.S.C. 709) may be such as is deemed necessary by the Secretary of the Air Force and such caretakers may be employed without regard to their military rank as members of the Air National Guard.

ARMY NATIONAL GUARD

For pay, allowances, clothing, subsistence, transportation, and gratuities, travel, as authorized by law, and related expenses for personnel of the Army National Guard while on duty under section 265 of title 10, United States Code, or while undergoing training or while performing drills or equivalent duties; expenses of training, organizing and administering the Army National Guard, including maintenance, operation, and alterations to structures and facilities; hire of passenger motor vehicles; personnel services in the National Guard Bureau and services of personnel of the National Guard employed as civilians without regard to their military rank, and the number of caretakers authorized to be employed under provisions of law (32 U.S.C. 709) may be such as is deemed necessary by the Secretary of the Army; subsistence for officers attending drills of 8 or more hours' duration in any 1 calendar day; travel expenses (other than mileage), as authorized by law for Army personnel on active duty, for Army National Guard division, regimental, and battalion commanders while inspecting units in compliance with National Guard regulations when specifically authorized by the Chief, National Guard Bureau; supplying and equipping the Army National Guard of the several States, Territories, and the District of Columbia, as authorized by law; and expenses of repair, modification, maintenance, and issue of supplies and equipment (including aircraft); $386 million: *Provided*, That obligations may be incurred under this appropriation for the foregoing expenses for training of units designated for early deployment under mobilization plans and for installation, maintenance, and operation of facilities or for antiaircraft defense of the United States and Hawaii without regard to section 107 of title 32, United States Code: *Provided further*, That the active Army National Guard shall be maintained at an average strength of not less than 400,000 for the fiscal year 1960 including not less than 55,000 input into the 6-month training program. (10 U.S.C. 311; 32 U.S.C. 104, 106–108, 315, 318–322, 502–506; 37 U.S.C. 232(e), 255, 301; sec. 30–31, Public Law 1028, 84th Cong.)

NEED FOR LEGISLATION

Mr. MAHON. Thank you very much, General Harrison, for your very clear statement.

You have discussed to some extent the problem of maintaining the National Guard at a level of 400,000 men.

I believe the majority of the members of this committee, and I am not authorized to speak for them, probably feel, as I do, that we should maintain this level.

Actually this is an Appropriations Committee, and we have no legislative authority as such. If we should include language making a 400,000-man guard mandatory it would be subject to a point of order. Last year it was in the 1959 bill because it was placed in the bill in the Senate and was accepted by the House in the conference.

We will give that matter appropriate consideration.

We on the Appropriations Committee do not want to be in the position of undertaking to usurp legislative authority from other committees.

Have you presented this matter of a mandatory provision to the Armed Services Committees of the House and Senate?

General HARRISON. No, Mr. Chairman, we have not had an opportunity this year on Army Guard strength to do that. We have had only three opportunities to appear before the Armed Services Committee or subcommittees of the Armed Services Committee, but they were on other matters.

There has been no opportunity to appear as a year ago with reference to what was happening in the Armed Services, and particularly with reference to the guard.

I understand the position of the Appropriations Committee in this case, Mr. Chairman, but we are very much disturbed, and I think you can appreciate the reason.

We had set and thought we had stabilization at 400,000.

But despite that, with indirection and by withdrawing and withholding of the means of maintaining that 400,000-man strength, we have been since last June at approximately 390,000 strength, and that is for one reason—the Department of Defense would not release funding and spaces provided by the Congress for the 55,000 trainees.

It is only within the last 2 months that we have gotten it, and whether or not we can make the superhuman effort of recruiting in 1 month about 10,000 individuals, I have my doubts.

If this program had been set so that 55,000 input might have been distributed each month for 11 months, excluding the month of December, we would have had a steady program and the recruiting efforts would be a continuing thing in each unit.

However, we have had nothing but hills and valleys.

BUDGET FORMAT

Mr. MAHON. General, you make very clear your suggestion as to changes in the format of the budget as it affects the Army National Guard and also the Air National Guard.

I am going to ask Mr. Crosby, who is the chief member of the Defense subcommittee staff, to look into the matter of the technical changes that would be required, and so forth, in order that the committee can give consideration to this idea. What it may do I am not in a position to say at this time.

Questions, gentlemen?

EFFECT OF WITHHOLDING OF FUNDS

Mr. SIKES. You have given us a valuable statement, General Harrison, and we are glad to have an opportunity to hear you.

I am reluctant to feel that the Department of Defense is deliberately circumventing the intent of Congress by withholding funds, and yet is there any other interpretation that can be placed on that action? Is there any other reason why funds would be withheld?

Since funds were appropriated, is there any reason that funds should not be made available as they were needed by the National Guard?

General HARRISON. None that I know of, sir, because since the beginning of the fiscal year the Department must have been aware of the fact that the guard each month has been under the authorized 400,000 strength established by Congress.

There are published reports by the National Guard Bureau of the strength by States with the total, and from last June that strength has been under 400,000.

I have my own record here, and I would be happy to leave it with the committee, showing a State-by-State report. The red figures show each date we were under that strength each month.

The Department of Defense gets a copy of that.

Mr. SIKES. The net effect of this withholding of funds very probably will be to give at the end of the fiscal year an average National Guard strength of less than 400,000 for the fiscal year, notwithstanding the fact that Congress specifically directed an average strength of not less than 400,000.

I want to be sure that this record shows that insofar as the National Guard is concerned that it is the belief of the National Guard that had the funds been made available as they were in fact required there would have been no difficulty in maintaining the strength figure that Congress specified.

Is that a correct statement?

General HARRISON. That is my opinion, yes, sir.

If the funds for the 6-month trainees of 55,000 had been apportioned evenly each month from the beginning of the fiscal year to the extent of 55,000 I am personally of the opinion that the guard strength today would be at 400,000.

Mr. SIKES. That is all, Mr. Chairman.

PRESENT STRENGTH OF GUARD

Mr. ANDREWS. What is the present strength of the National Guard?

General HARRISON. The last figure was February 28. The March 31 figure has not been published yet. The February 28 figure was 390,637.

Mr. ANDREWS. Do you have the strength as of last July 1?

General HARRISON. The strength figure I have, sir, is 31 July, which is the first monthly figure in this fiscal year, and it was 391,834.

It has run in between, about 391,000 to 392,000 up until February when it went to 390,000.

Mr. ANDREWS. Is there a threat to withhold money in order to pull that figure down to 360,000?

General HARRISON. The budget calls for a strength of only 360,000 for fiscal 1960.

Mr. ANDREWS. I am speaking of fiscal 1959. Do you know anything about the plan to apportion the money for the remaining months of this fiscal year?

General HARRISON. The release of approximately 11,000 trainees which had been withheld from the beginning of the year was made on March 19. That is a little more than a month ago. The quotas were increased for April, May, and June. It was increased up to 9,400 for April. It was increased up to 8,000 for May, and up to 5,100 in June.

Mr. ANDREWS. What effect will that have on your total strength?

General HARRISON. If we can attain those input quotas it will probably increase the strength maybe 5,000 or 6,000 or 7,000 at the most.

Mr. ANDREWS. That is all, Mr. Chairman.

EFFECTS OF INSTABILITY

Mr. FLOOD. I was just wondering if this continued up-and-down business with the bodies in the Guard does not force, contribute, or actually bring about the chief reason for making necessary these continual and irritating reorganizations of the Guard within the State, the taking of one unit from one city and putting it in another city, changing the command echelons and headquarters echelons every time that this chart goes up and down.

I have the impression that it makes necessary these repeated reorganizations within State Guard commands which certainly do more harm than good, if that is the reason.

General HARRISON. I am of the opinion that the instability, both strengthwise and in the allocation of 6-month training spots, has a great deal to do with the unrest. It does not provide for proper planning, for recruitment, for training, for anything else.

There is a tendency of creating an attitude, "Why should I bang my head against the wall continually?"

Mr. FLOOD. One of the chief attributes of the National Guard is to establish in small cities and towns a certain artillery or infantry unit, whatever it might be, and in the parades on patriotic occasions they appear with battle streamers that go back to the Revolution and the War Between the States, and then with these fluctuations in personnel, out of the clear blue sky, the State is forced to reorganize its components and they have to take this old historic unit and it winds up 50 miles away in another city, or it winds up with some kind of unit that never had any tradition. If that results from these peaks and valleys it is a bad thing.

General HARRISON. It probably has had such an effect, but with changing conditions in ground troops and the need for different types of units from what we fought World War II with, all of us in the National Guard realize we have to conform with this new organization. I will agree with you, Mr. Flood, that in communities where they probably had rifle companies for several centuries, such as in my own State where the organization goes back to 1636, an Infantry regiment, some of those companies that formed that regiment are now artillery, or are now something else, and the feeling is gone.

Mr. FLOOD. I do not mean the change is properly the result of the development of new weapons systems and a new type of warfare. That is intelligent, commendable, and necessary. I do not mean that kind of thing, of course.

I do not expect my supply trains to be covered wagons in the Pennsylvania National Guard. I do not mean that. I refer to where this cut in bodies at the national level passed down the line forces the merging and elimination of established units of great tradition in their own arms.

General HARRISON. That is probably true, Mr. Congressman. There is less and less opportunity for individuals to serve if the strength of the unit is cut back. I don't know what the conditions have been in all of the States with reference to this reorganization.

I do know that in my own State I have lost only two communities because of the reorganization.

Mr. FLOOD. That is two too many.

General HARRISON. I will agree.

Mr. FLOOD. What is your State?

General HARRISON. Massachusetts, sir.

Mr. FLOOD. What division is that?

General HARRISON. The 26th.

Mr. FLOOD. General Palladino used to be there, did he not?

General HARRISON. Yes, he commanded one of the infantry regiments in the division during the war, the 104th Infantry.

Mr. FLOOD. I know that outfit. It is a fine outfit.

BUDGET FORMAT

Mr. FORD. General Harrison, without indicating my own attitude on the present budget structure for the Army National Guard or the Air National Guard, or that which is proposed, and I have not made up my mind one way or another on the matter, I wonder if your prepared statement does accurately indicate what the proposed structure might do.

I gather from your statement that you are saying that if we go to this new format the Army, for example, could take some of the Army National Guard O. & M. funds and utilize those funds for the Active Army.

Is that what you are saying?

General HARRISON. That is what we believe the authority will be under the format which is proposed. We are fearful of that.

Mr. FORD. Looking at the bill as it has been submitted in this new format it states: "Operation and maintenance, Army National Guard," then there is additional language, and then a dollar figure.

If I understand the proposed budget structure accurately, whatever we would make available in that account could not be transferred to or utilized by the Active Army.

Can you explain how the Defense Department or anybody else could transfer funds from this specific account in O. & M. to Army active duty O. & M., or any other account?

General HARRISON. Only if the general language in the bill gave that authority. We were of the opinion that that authority will be in the hands of the Secretary of Defense and the Department of the Army to transfer funds.

AUTHORITY TO TRANSFER FROM ONE APPROPRIATION TO ANOTHER

Mr. FORD. I respectfully suggest that under the previous appropriation bills, and I think the same would apply in this format if it is approved, the Department of Defense has no authority to transfer from one account to another, with one limited exception, and that is research and development account into the emergency account and out of the emergency account into another R. & D. account.

There is no broad transfer authority allowed from one general account to another general account.

For that reason, based on that experience, I wondered how you came to the conclusion that you seem to indicate.

General HARRISON. As a member sitting on the Reserve Forces Policy Board, and listening to comments of my associates there who represent other components, I know that that did happen in one instance a year ago.

Mr. FORD. Can you recall what it was?

General HARRISON. I think it was in the case of the Navy or Marine Corps funds which provided for the support of the Naval Reserve and Marine Corps which were transferred and used for something else.

Mr. MAHON. General Moore, what would be your comment?

General MOORE. There is no authority in the absence of a specific act of Congress in the past to transfer from any of the Reserve components to another appropriation in the act.

I might add that the remarks made by Mr. Ford are absolutely correct with respect to the current budget now being considered, and the mere grouping of various appropriations under a title, whose purpose is to get similar kinds of appropriations together, does not give you one iota of authority to transfer between agencies or from one to any of the others.

Mr. MAHON. General Moore, did we not at this session or in the last session provide for the meeting of certain obligations a transfer of funds? That was done in a supplemental appropriation or deficiency?

General MOORE. We asked for funds and the committee saw fit to add this remark: "To be derived by transfer from X, Y, Z."

If you have funds that are not otherwise being used that method is resorted to often.

Mr. MAHON. In lieu of a direct appropriation?

General MOORE. Yes, sir.

Mr. MAHON. But this requires a congressional act.

General MOORE. That is right.

Mr. FORD. I think your fears would be based on fact, General Harrison, if the proposed Army National Guard operations and maintenance funds were included in the big package of Active Army operation and maintenance funds.

Then, of course, there could be a withholding or a diversion of Army National Guard O. & M. funds to the Active Army if the Army decided that was to be their decision.

However, where you got a specific account set up in the Appropriation Act as is proposed here for Army National Guard O. & M. funds, no such transfer can be made by the Department without Congressional action.

General HARRISON. I appreciate your bringing that up, Mr. Congressman, and I appreciate the discussion and explanation made by General Moore. It makes me feel a little easier.

I had been concerned, disturbed and plagued with this matter of withholding and diversion of funds.

We have the example of funds being appropriated and then withheld until the end of the fiscal year by the Department, and this is not the Department of the Army which withheld these funds. The Department of the Army has been completely in support of our 6 months' training program and the even flow of personnel, but the Defense Department has not permitted the funding. Even though it is as you say, and I am satisfied that is the case, we will still have the problem with respect to funding.

Mr. FORD. I am not sure this proposed format is the right thing because I do think the circumstances are different in the case of the guard and in the case of the Reserve Forces, which might tend to justify a lumping of their personnel funds and their O. & M. funds, and in some instances their procurement fund, but I think we now

have in the record an explanation which should alleviate some of your fears if the proposed format does appear in the act in its final form.

General HARRISON. I appreciate very much your bringing it up because it certainly is in the record.

Of course, as you know, the guard has enjoyed this separate funding right along. The Reserves have wanted it.

If they are concerned about enjoying what we enjoy, we felt taking what we had enjoyed away might lead us into the problems that the other Reserves had.

Mr. FORD. I must take exception to one sentence that you have in your prepared text, and I quote from page 1:

> In this respect some of our leading military figures have publicly proclaimed that too large a portion of our military budget is devoted to the ultimate weapon leaving our conventional forces to become stepchildren on the road to oblivion.

Two exceptions: One, I think you should have added a word here to the alleged ultimate weapon, because we have heard reams of testimoney here that even ICBM's are not ultimate weapons. We are spending a tremendous amount of money for another generation of weapons which I suppose some people would say are the ultimate weapon in the era of 1970 or thereabouts.

At the same time I must take exception to this: Even if we go to 360,000 for the Army National Guard, and I am not saying we should or should not, that is a sizable and effective Army National Guard strength.

It may not be what you and many others want but it is a first class Army National Guard, particularly with the 6-month training program which now has been in effect some 4 years.

I think you have a very good National Guard and I believe it has been substantially bolstered by this 6-month training program which at least some in the National Guard fought against tooth and nail at the time it was originally proposed.

EFFECT OF REDUCTION TO 360,000 STRENGTH

General HARRISON. What the reduction in strength will do, Congressman, is this: It will either mean we will have to cut back additional units and eliminate them, as Congressman Flood said, from some of our communities, to the extent of a total of 40,000 individuals, or we will have to reduce the strength of units below that that the Department of the Army and Army officers say is a proper strength for training. That is why we object.

Mr. SIKES. I have a great deal of confidence in the National Guard and its personnel. I think we will have a good National Guard no matter what strength is assigned to it. I think we will have a lot better National Guard if we keep the strength of 400,000 which has been agreed on by the Congress and the National Guard, and I believe by the Department of the Army, as the most effective figure that we can hope to have.

I submit it is not so much a matter of having a good one as having the best one we can, Mr. Ford.

Mr. FORD. I supported 400,000 last year, as the gentleman knows. I do not think we should say categorically that if you go to 360,000 that the National Guard becomes a stepchild on the road to oblivion. That just is not true.

It is a first class National Guard whether it goes to 360,000 or otherwise. It is not a stepchild on the road to oblivion.

General HARRISON. If they keep knocking off, Mr. Congressman, 40,000 a year, it will not be long before we would be in oblivion, and that is the intent. I do not mind saying it here. I know.

Mr. FORD. I disagree with some people if they have in mind going from 360,000 to something smaller.

General HARRISON. If the Congress had accepted last year the strength of 360,000 recommended, the strength submitted this year to the Congress for the guard would have been 320,000. That I know to be a fact.

Mr. FORD. As I say, I do not know what the alleged facts are, but I still say that going to 360,000 does not make the guard a stepchild on the road to oblivion.

General HARRISON. It pushes us eventually out.

Mr. BOYLE. Will the gentleman yield?

Mr. FORD. Surely.

Mr. BOYLE. We all have to wake up to the realization that the cold war is a different type of tournament or conflict than we have ever been exposed to before, and in the light of our huge military peacetime budgets, which is now about $45 billion and will become exceedingly larger as the years go on, it is about time to revamp our thinking and get more and more civilians attuned to the responsibility for getting into this tournament and defending the country, because I think the testimony——

Mr. ANDREWS. Will the gentleman yield?

Mr. BOYLE. Yes, sir.

Mr. ANDREWS. Last year, figures were given to us indicating that for the cost of keeping one man in the Regular Army we could retain 7.8 men in the guard. I think those are the figures you have in mind.

Mr. BOYLE. That is correct.

Mr. FORD. I think the cost is about $6,000 a year for an active duty Regular, and about $1,000 a year for a Reserve, either the guard or the Army Reserve.

Mr. BOYLE. If the gentleman will yield further, I want to subscribe totally to the observation made by Congressman Sikes, from Florida, regarding his evaluation of the National Guard.

Mr. MAHON. Any further questions?

Mr. MINSHALL. General, from my own personal viewpoint, I certainly subscribe to the fine job the National Guard has done and is presently doing and will do in the future. I speak not only as a member of the committee but as a former National Guardsman. I know at firsthand of the fine quality of the job that you have done and, above all, of the fine quality of the men you have had in it. The ones I have been associated with have been tops.

General HARRISON. Thank you, sir.

PLAN TO FURTHER REDUCE GUARD

Mr. MINSHALL. One thing which concerns me is the reduction of 40,000 in the National Guard strength. You say in answer to Mr. Ford's question that you know for a fact they are thinking to reduce the National Guard even further. Whose thinking is that? I wonder if you would elaborate on that, please?

General HARRISON. I am not privileged to say where I have heard it, but it comes from reliable sources.

Mr. MINSHALL. In other words, it is class A scuttlebutt.

General HARRISON. It comes from reliable sources in the Pentagon.

Mr. MINSHALL. I use that word "scuttlebutt" advisedly.

General HARRISON. I think the trend is to eventually eliminate all ground forces.

Mr. MINSHALL. That still would not eliminate the Air National Guard.

General HARRISON. No, but the Air National Guard is a small part of overall numbers in the national defense picture.

Mr. MINSHALL. You think what they are striving for is a single service?

General HARRISON. I do not know about that. I think there has been too much emphasis on massive retaliation and the big bang. I do not think we shall ever——

Mr. FORD. I tend to subscribe to that view, incidentally.

Mr. MINSHALL. That is all the questions I have, Mr. Chairman.

Mr. MAHON. Thank you very much.

Mr. NORRELL. May I make a statement before you close?

Mr. MAHON. All right, Mr. Norrell.

Mr. NORRELL. I cannot speak except for myself. As far as I am concerned, I shall vote to have the same National Guard next year that we have had this year. I am not willing to trust the Army to do anything less than we have had in the present year. I realize the President can probably do what he wants to do, but I am hopeful that he will go along with the Congress in permitting the National Guard to be constituted next year as it has been this year.

Thank you, Mr. Chairman.

Mr. MAHON. Mr. Sheppard.

BUDGET FORMAT

Mr. SHEPPARD. General, personally, I listened to your statement with a great deal of interest. It was all interesting, but one section impressed me, toward which, because of my years of exposure up here, I have a very sympathetic inclination. That is taking the National Guard and putting it in a budget category under its own title and function. The only regret I have is that you did not make it all-inclusive, because I think each one of our military branches should very definitely stand on its own, be analyzed on its requirements and adjudicated and appropriated for accordingly.

The way things are presently going, there is a very definite trend to an amalgamation which throws the control completely in the Office of the Secretary of Defense; and, personally, I am against that kind of operation. So at least you have a case that I am going to grab onto as far as I am concerned. I think it is a good approach to a cleanup which is long overdue in the field of segregating accounts wherein in each of the branches it stands on its own requirements and is adjudicated according to its requirements and we quit a lot of this transferability.

Mr. MAHON. Thank you very much, gentlemen. We shall be glad to have you again at any time.

I turn the committee over now to Mr. Sikes.

WITNESSES

DR. BURNS A. DOBBINS, JR., M.D., CHAIRMAN, MEDICARE MEDIATION COMMITTEE, FLORIDA MEDICAL ASSOCIATION
DR. A. T. KENNEDY, M.D., PENSACOLA, FLA.,
N. G. JOHNSEN, MEDICARE COORDINATOR FOR FLORIDA

Mr. SIKES. Mr. Chairman, I feel the committee is privileged today in having before it Dr. Dobbins and Dr. Kennedy, both recognized as outstanding physicians in my State of Florida, representing the Florida Medical Association, for a discussion of the medicare programs.

Florida is one of the States, Mr. Chairman, which is affected to considerable degree by the medicare program, and the Florida Medical Association has possibly given more study to the manner in which this program is being administered than has any other State association. Therefore, I think it will be advantageous to the committee to have the observations of these gentlemen and, with your permission, I will ask Dr. Dobbins to proceed.

Mr. DOBBINS. Mr. Chairman, I am Burns A. Dobbins, Jr., M.D., a practicing physician in Fort Lauderdale, Fla. I am chairman of the medicare mediation committee of the Florida Medical Association, and am speaking for that association today. I have been on this committee since June of 1957 and was one of the FMA's three-man team that negotiated the since-amended contract with ODMC in January 1958. For the record, I have received $140 in fees from medicare since its beginning in December 1956, so my personal financial interest is quite small.

Florida is the third largest participant in the medicare program and we feel that the Florida Medical Association has had experiences and some opinions which may be of some value to this committee in planning for the future appropriations and administration of the "Dependents Medical Care Act".

Public Law 569 was passed by the 84th Congress for the expressed purpose of creating a higher morale in the armed services and providing more uniform medical care for dependents of the various branches of the services. There have been different interpretations of the word "uniform" as used in this act. To us, after careful reading of the phraseology, it means the same medical care, both as to type and amount, to all dependents of the various branches of the armed services.

We feel that the drastic curtailment put into effect October 1, 1958, has worked directly against both purposes of the law. No longer is medical care uniform among dependents—those living with sponsors near military medical facilities have a decided advantage, and profit much more from the program. At the same time, the dependents of servicemen who are overseas and away from their families are being discriminated against in that a number of medical services are denied them unless the dependents are living in close proximity to a military medical installation. This situation works against morale, the other purpose for which the Congress intended Public Law 569, because of the increased concern when a serviceman, separated from his dependents, knows that medicare will not provide the same medical care as when they are with him.

Perhaps refinements and changes in the program were definitely necessary both to reduce costs and perfect its administration. Although the ODMC has done a most commendable job in organizing the tremendous program of medicare, we feel that the Defense Department acted too hastily when the "crash program" of curtailment was put into effect October 1, 1958.

The reasons advanced for the necessity of reducing medicare were quite valid in that appropriations of funds were not made for the rapidly rising costs of the program. Congress was rightly concerned with these costs, but it is hard to conceive that Congress was putting finances above the health and medical care of some of the dependents involved when the purpose of Public Law 569 was to provide more uniform medical care. It is our belief that Congress intended for the Defense Department to very carefully review medicare, institute refinements not contrary to the purposes and intentions of the act, and seek a deficiency appropriation of proven necessity.

In either event the changes instituted October 1, 1958, have worked a definite hardship on many dependents and have made medicare much more difficult to administer on the civilian side.

Naturally there has been some confusion on the military's part in properly following the revised medicare benefits, but these people are accustomed to sudden changes in policy and different forms to fill out. It has been most difficult to orient civilian physicians who have an innate aversion to military forms and Government redtape.

Now that all dependents are divided into two categories, one group who lives with their sponsor and the other who lives apart, a dependent of the first group can seek civilian medical care only if she has a properly filled out permit signed by the sponsor's commanding officer or his designee. However, this permit is not a Government order and carries no guarantee of payment. It is the civilian physician's responsibility to decide whether or not the medical service sought is compensable under the program. Servicemen and their dependents are taught to believe that the commanding officer knows what he is doing and it is often difficult to convince them that the permit is invalid and the medical costs will not be covered by medicare. This fact has discouraged many private physicians from participating in the program.

Officials of the Defense Department, in testimony before Congress last year expressed much concern over the decreased use of military medical facilities since the inception of medicare. Waste of existing facilities plus the lack of patient material for the residency training program were the principal causes of alarm. As for the latter reason, we can't feel too much concern because it is and has always been possible for the armed service to procure necessary training facilities in civilian hospitals.

However, as taxpayers we are greatly interested in the waste of space and personnel experienced in presently existing service medical establishments since medicare began. Certainly these hospitals have the finest physical facilities with excellently trained personnel, both professional and ancillary. Then just why have dependents elected civilian hospitals and medical care over military? Perhaps it is time for the Defense Department to take a long penetrating look for the causes of this exodus. Maybe the "art" of medicine which is such a necessary adjunct of scientific medical care is not being practiced

as it should be and patients are not being made to feel that they are individual human beings.

Dependents of members of the armed services are not, themselves, members of these services and should not be coerced into using military medical facilities just because they are not being used to optimum capacity or there exists a dearth of teaching material for certain medical specialties. Inducements of more personal attention to each dependent as a person, and reduced costs, as explained later, should be used rather than compulsion to take military medical care or get none.

Members of the Florida Medical Association have a twofold interest in medicare—as participating physicians and as taxpayers. As the latter we are acutely conscious of the increasing costs. The six members of the State mediation committee contribute one weekend a month when they assemble to mediate questionable claims. The committee is supported by a similar group in each county society which studies claims for conformity to local fees and practices. The only cost to the Government is the travel expense of the State committee.

Our members have reluctantly gone along with the curtailments instituted unilaterally by the Defense Department in a properly negotiated contract. We do not believe that Congress ever intended to further penalize a man who must serve his country away from his family by prohibiting medicare from providing full benefits for his dependents. The Florida Medical Association has elected to participate on a temporary basis until Congress has had the opportunity to study the program and express its wishes. We certainly believe that Congress will feel as we do that the proper care of the individual must be the prime consideration.

We certainly are not opposed to reducing medicare costs; we feel that this can be done in such a manner that the original purpose of the Public Law 569, uniform medical care, will not be lost and the program can be stabilized as to the medical care each individual dependent can expect. We believe that a definite insurance plan or plans, which is the alternative provided by Congress in title II, section 201(a) of Public Law 569 will provide this stability and furnish the Defense Department and Congress with an accurate estimate of the annual cost based on the estimated strength of the Armed Forces Such a policy could even be offered on an attractive voluntary basis to each individual with the Government bearing the major expense and the serviceman participating financially to a much lesser extent. A deductible feature could be incorporated as a restraint on excessive demands for medical care as provided in (c) and (d), section 103, title I of Public Law 569.

With a definite insurance plan, dependents would know just what medical care to expect and civilian physicians could be certain of the services for which they would receive compensation. Such a plan would be based on the medical care Congress intends to provide for the health of the individual and not on the finances of the particular year. If at some future date Congress should decide it was necessary to reduce the cost of the program to the Government, the ratio of the Government's financial participation in each policy could be reduced, and that of the individual raised so that the medical benefits to the individual would remain constant.

In order to encourage those dependents who are in the proximity of a military installation to use the medical facility therein the deductible amount could be considerably less than the amount necessary for care in a civilian facility. Under this plan any dependent could have his choice and all dependents regardless of residence would have available uniform medical care as Congress intended them to have.

These insurance plans could be administered either privately on a competitive-bid basis or by the Government with a permanent agency. We emphasize a "permanent agency" because although the present ODMC has done a magnificent job in handling the organizational problems of medicare, it is necessarily subject to changing military medical personnel. These changes are necessitated by either rotation or retirement. As explained earlier, dependents are not members of the armed services and we can see no more valid reason for their medical care being supervised by the military than any other of their daily living requirements. Therefore, the Defense Department should not be burdened with the responsibility of administering the medical-care program for these civilians.

Mr. Chairman, please permit me to express my personal gratitude and the appreciation of the Florida Medical Association to you and your committee for your patience in hearing the views of the Florida Medical Association on Public Law 569. Also, I want to assure you of our continued interest in the program.

If there are any questions, we will welcome the opportunity to discuss them.

Mr. SIKES. Thank you very much, Dr. Dobbins.

I know a great deal of time and thought have gone into the preparation of this statement. It certainly directs attention to some very pertinent points which I am sure the committee will want to discuss with you.

Before we do that, I think we should hear Dr. Kennedy. Will you proceed, Dr. Kennedy.

Dr. KENNEDY. Mr. Chairman, it is indeed an honor and a pleasure to be here today and to have the privilege of appearing before this committee.

We of the Florida Medical Association are primarily concerned with economical, stable, uniform adequate medical coverage for the dependents of all uniform services.

Whereas these dependents are treated by a relatively small segment of the medical profession, we feel that the proper management of the patients is the concern of all physicians as part of their responsibilities as citizens.

I would like to reiterate what Dr. Dobbins has said about insurance type coverage. Under a definite insurance program the dependents would know just what medical care they could expect and receive. I know that this committee is concerned with dollar expenditures. I realize also that it has been of concern to this committee that the cost has been rising each year. I know that the money to support such a program must come from somewhere. This can be done in two ways: (1) a portion of the cost to be borne by the serviceman; and (2) a sliding deductible feature to be increased or decreased every 12 months to help make the plan actuarily sound.

This cost can be stabilized by going to an insurance type program (which is allowed under title II, sec. 201(a), Public Law 569).

We in Florida favor the Blue Shield and Blue Cross type coverage, but commercial insurance could also be used. It is the belief of the majority of doctors of Florida that this insurance program should eventually be extended to cover all dependents.

We have with us Mr. N. G. Johnson of Florida Blue Shield who can supply information from his rich background of experience with administering a health insurance plan.

I am grateful to my own Congressman, the Honorable Bob Sikes, for arranging for my appearance before you today.

Mr. SIKES. Thank you, Dr. Kennedy.

Questions, Mr. Sheppard.

Mr. SHEPPARD. No questions.

Dr. DOBBINS. Mr. Johnson is the medicare coordinator for Blue Shield and is the fiscal agent for the Florida Medical Association. He knows some of the background. That is another reason he is here.

Mr. SIKES. Very well. We may want to ask him some questions.

Mr. FLOOD. I am wondering, are these conditions peculiar to the situation between you people and the Military Establishment in your State, or is it your opinion from what you know or hear that this is pretty generally the case?

Dr. DOBBINS. It is general. The same regulations apply throughout the United States.

Mr. FLOOD. I know about the regulations, but I meant your experience.

Dr. DOBBINS. Yes. Two of the States have pulled out from the contract, Texas and Oklahoma, after the reduced benefits and curtailments in the program. We have not done so. Some of our physicians are unhappy because these people cannot get the service which they think they are entitled to, and they cannot render it. It is quite a problem.

Mr. FLOOD. What about the house of delegates at AMA? Have they reacted lately? Will this be before them, or is that necessary?

Dr. DOBBINS. I cannot answer that question. There was a meeting in Minneapolis at the interim session of the AMA. The Federal medical services committee of the AMA sponsored a joint meeting which committee members from all over the United States attended, and no definite program came out of it. I do not know what they will do in June when we meet again. I know that other States have a similar situation.

Mr. FLOOD. Do you propose to send them a copy of your statement?

Dr. DOBBINS. Yes. They have a copy of it, as a matter of fact, already.

Mr. BOYLE. Doctor, I want to commend you on your worthy efforts of trying to resolve this ever-increasing human problem. You gentlemen who are actively participating in the program should be congratulated. I am glad your testimony reveals you have so little personal monetary interest. As we proceed along this area we must have more and more of good people actively participating with their time and talent in the responsibility of sharing up not only national defense but a byproduct of the national defense such as medicare.

Dr. DOBBINS. Thank you.

Mr. SIKES. Mr. Ford.

PARTIAL UTILIZATION OF MILITARY HOSPITALS AND OVERCROWDING OF CIVILIAN HOSPITALS

Mr. FORD. I think the statements are excellent. I have only one question which bothers me about the overall situation. A certain specific case was called to my attention which I could not rationally answer. It was an instance where there was a rather large military installation, more or less self-contained. When the medicare program went into effect, there was a sizable exodus of patients being treated on the base and a considerable number going into the surrounding communities for medical care. A fine military hospital, relatively new, was not fully utilized. Within a relatively short period of time the civilian hospitals on the outside became overcrowded. The net result was that we immediately had a request for additional Hill-Burton funds from the Federal Government to build up these civilian hospital facilities just outside this particular military installation.

So here you had a military hospital, relatively new, not utilized to a sufficient degree really to keep it open, and thereafter additional Federal funds, 50 percent of the cost of a new civilian hospital, were requested to build up civilian hospital facilities 5 miles away.

How can we justify that?

Dr. DOBBINS. We are concerned about those costs, too, as you will note in the testimony, of the nonutilization of presently existing military medical facilities. First of all, I think the novelty of the situation accounted for some of that immediate exodus. Secondly, as I pointed out in the testimony, we would like the Defense Department to study just why people seek civilian care rather than military care. Perhaps there is something lacking in the military care which could be added to entice them there.

Also, under a broad insurance program—we are not advocating a particular type—the deductible feature of a military medical installation could be incorporated and it could be smaller than they would require for civilian care, therefore making it financially more attractive for them to utilize the military facilities. We are concerned about that problem, too.

Mr. FLOOD. Will the gentleman yield?

Do you have any information at all on that incident as to the number of cases that were maternity cases?

AVOIDANCE OF MILITARY HOSPITALS BY MATERNITY PATIENTS

Mr. FORD. I do not recall the specifics. I think I probably could get that information. It is such an odd situation. Here we were going to cut down substantially the utilization of something Uncle Sam constructed, on the one hand, and almost overnight there was a request for $500,000 or $750,000 as the Federal contribution to the construction of a civilian hospital to take care of military dependents within 5 miles of this military hospital. It did not make sense to me.

Mr. FLOOD. I have heard a lot of complaints all over the country. I never examined the mortality rate or the infection rate in military installations in maternity cases, but apparently the women are gun-shy on maternity cases for some reason. Have you ever heard that point raised?

Dr. DOBBINS. I think a similar situation has existed all over. First of all, I think it is novelty to get out——

Mr. FLOOD. I meant specifically with reference to maternity cases.

Dr. DOBBINS. It has been true in a lot of instances that maternity cases like to choose their own doctors. You know, women become attached to one doctor who delivers them, and they want to go back to him. Sometimes they will travel many miles for that reason. That condition is just human nature.

Of course, in military hospitals the doctors rotate. They might see one doctor one time, and the next time they see another doctor. They like to have confidence in the man who is to deliver them, and know who he is to be.

Mr. FLOOD. I am curious about that. You might suggest to the staff that they inquire of the Surgeons General of the different branches if they have any statistics with reference to this question of the dependent expectant mothers, maternity cases. Why do they think they want to go to civilian hospitals? Is it fear of infection, lack of care, interest or understanding? What about these maternity problems? It seems to be a developing problem.

Mr. LAIRD. A lot of these women are going back to their homes to have their babies, too. Just the same as with Members of Congress, they like to have this freedom of choice. My wife would not think of having a baby here in Washington. We have always gone home just because we always have the same doctor. I think that is part of this whole thing. It is part of the philosophy of medical care that you want to be able to choose your own doctor.

Mr. FLOOD. I think that is true, but I was concerned more about whether there is a lack of understanding, right or wrong, as far as the women are concerned, in the military installations with reference to prenatal care, maternity care, and postnatal care. What is the infection rate? It may be all wrong or it may be very true. If that rumor is around or if that is what they think, then it is a serious problem.

Dr. DOBBINS. I doubt very seriously that they take into consideration the infection rate. I do not know the statistics, but I do not think the ratio would be any different from any other place. I think it is more as Mr. Laird has said, that they prefer their own doctor and will go back to him. They like to have the choice. They like the same one. Women like to see the same doctor when they have a baby. That is just human nature.

Mr. BOYLE. If you put in the record the figures Mr. Flood suggested, it might rebut some of the whispering directed to the fact that maybe they get second-class attention and actually second-class specialists when they use into these military facilities.

POSSIBLE CHANGES IN MILITARY HOSPITALS

Mr. SIKES. We will have the staff look into that, but I wonder, Dr. Dobbins, if your group would have any specific recommendations to Congress or to the Defense Department regarding changes in procedure in the military hospitals which might make them more acceptable to the families and dependents.

Dr. DOBBINS. I do not know, sir, without studying it. Of course, I had naval experience during the war, but not looking after families. We were out in the Pacific and did not have that problem. I do know the concern that the men overseas would have for the care of

their families back home. That is one of the reasons I have been so particular in emphasizing in this program that I do not believe Congress intended to discriminate against a man who is away from his family.

Perhaps some changes could be made. It is a little hard to establish personal physician-patient relationships in a military installation because of the changes. As far as the type of hospital and the care they have, I think it is good. We intend no reflection on it, nor do we intend any reflection on the ODMC. They have done a tremendous job. I was not just filling space when I wrote that. They have been most cooperative, and it is a pleasure to work with them.

Certain refinements had to come in this program. One of the first we advocated to General Robinson as early as December 1957 was to cut out paying for drugs. The doctor had to buy the drugs and then charge the patient. They cut that out the first of July, and it has been much easier to administer since that time.

Mr. SIKES. Mr. Laird, have you any questions?

Mr. LAIRD. No questions.

Mr. MINSHALL. No questions.

POSSIBLE INSURANCE PROGRAM

Mr. SIKES. I suggest that we ask Mr. Johnson to tell us how, in his opinion, an insurance program could be utilized for the same money or for less money in an effort to hold down future costs.

Mr. JOHNSON. Mr. Chairman, I do not come prepared to speak for the National Blue Cross Association on this subject, nor am I authorized to speak for them, but it is my belief that the insurance type of approach to this problem was not aired in the original hearings. Basically, it appears that to share the cost with the sponsor would have a leveling effect on what it would cost the Government to furnish a uniform program for everyone. This facet of the problem and the solution thereof might well be investigated.

Mr. SIKES. Has the Department of Defense been asked to study the possibility of substituting an insurance program for the present program, Doctor, do you know?

Dr. DOBBINS. No, sir, not that I know of. I know it is provided for in the act, but I do not think they have studied it, as far as I know.

Mr. SIKES. I think the committee might ask the Department of Defense for their reaction to this. Will you look into that, Mr. Crosby?

Mr. CROSBY. Yes, Mr. Chairman.

(A statement by the Department of Defense follows:)

STATEMENT ON "THE INSURANCE PLAN MATTER"

The following comments, which include appropriate background information explain the basic reasons why the Secretary of Defense established initially a form of medical service plan providing for full service coverage with certain stipulated charges to be paid by the patient, rather than an insurance plan.

The Medicare Act (Public Law 569, 84th Cong.; presently codified as 10 U.S.C. 1071–1085), charged the Secretary of Defense with consulting with the Secretary of Health, Education, and Welfare, and then contracting for medical care for certain dependents under such insurance, medical service, or health plan or plans as he deemed appropriate. The plan chosen had to provide for certain

types of care and certain stipulated charges to be paid by the patient. The terms "medical service," "insurance," and "group health" plan were explained in the report of the full Senate Committee on Armed Services on H.R. 9429 (see S. Rept. 1878, 84th Cong., 2d sess., 30 Apr. 1956, at p. 5) as follows:

"Under the medical service concept, intermediaries such as the Blue Cross-Blue Shield organizations secure agreements from physicians and hospitals to provide designated services and facilities in exchange for stipulated fees and charges. Members of the organizations pay monthly premiums for the privilege of availing themselves of the medical services and facilities provided in the agreement. The organization acting as intermediary, rather than the person receiving treatment, compensates the physicians and hospitals providing the service.

"Health insurance, stated generally, involves an agreement by the underwriters to pay specified sums if the insured person requires medical care and hospitalization of the types covered by the policy. The person covered pays a premium to the insurance underwriters. Benefits under the policy are paid to the insured, who in turn compensates the physicians and hospitals providing the services. The fees and charges do not necessarily correspond to the benefits paid under the policy.

"Group health plans provide medical service through their own clinics and physicians and hospitalization through contracts with local hospitals."

The Secretary of Defense, after due deliberations and consideration, adopted a form of medical service plan for implementation rather than an insurance plan. He stated in a succinct manner his reasons for doing so in a letter to Senator Green dated May 29, 1957. At that time, the full service concept was being protested by the Rhode Island Medical Society. The pertinent portion of the Rhode Island letter is set forth below:

"In discharging the responsibility placed upon me by the act, I determined that it would be implemented by a form of medical service 'plan' and that such a plan would provide for full service. In this connection, may I also invite your attention to page 6026, 'House Armed Services Committee hearing on H.R. 9429' (H. Doc. 59, 84th Cong., Feb. 21, 1956), wherein Congressman Kilday explained the differences between indemnity insurance coverage and the medical service plans offered by Blue Cross and Blue Shield, and pointed out that Blue Cross and Blue Shield pay for the services received, i.e., the entire bill. My decision to adopt a form of medical service plan with full coverage was made in the light of the wording of the law and of the congressional hearings thereon. Further, in formulating the joint directive, which embodies the full service concept, the advice and assistance of representatives of the American Medical Association, the insurance industry, Blue Cross and Blue Shield, and others were obtained."

The act itself covers charges to be made to the patient for civilian care received. It is important to remember that section 201(a) of the act described certain care to be covered under any plan adopted and stipulated the charges to be made for that care. Section 201(b) of the act authorized the Secretary of Defense to make such reasonable limitations, additions, exclusions, definitions, and related provisions as were deemed appropriate. Under that section, certain additional care over and above that described in section 201(a) was authorized, e.g., nursing care, private rooms in certain circumstances. Since this represented additional care, patients were required to pay a proportion of the cost. The important point here is that, for care required by section 201(a), the amount to be paid by the patient was stipulated.

If the Secretary of Defense had adopted an insurance plan, the provisions of the act covering the amount to be paid by the patient would still be applicable. In this connection, attention is invited to the description of health insurance set forth above. The provisions of the act authorizing contracting for an insurance plan must be read in context with the provisions stipulating the amounts to be paid by the patient under any plan adopted. From a reading of the act in its entirety, it appears that, if an insurance plan were adopted for implementation, the Government would have to pay premiums for each eligible dependent. The insurance company would have to undertake to pay the benefits to be provided to eligible dependents under the act, except for the charges stipulated in the act as being the responsibility of the patient. In calculating premium rates, consideration would have to be given to such factors as the number of dependents eligible for benefits under the program; the level of physician and hospital charges in the area covered; the proximity of dependents to uniformed services medical facilities; and the frequency with which uniformed services facilities would be used (at no cost to the insurance company) as against the frequency with which civilian

facilities would be used (at a cost to the insurance company). There would be so many unknown factors involved that provisions would have to be made for a retroactive revision of the premium rate based on audited experienced costs. Additionally, any premium rate finally established would probably have an element of profit for the insurance company.

The Secretary of Defense's medical service plan described above does not involve an insurance policy and does not require payment of premiums. Rather, cost reimbursement, nonprofit contracts were written. The contractors pay for authorized care rendered to eligible dependents and are reimbursed for the amounts so paid. Additionally, they are reimbursed for their administrative services. Those reimbursements are audited periodically and adjusted to actual costs, without an allowance for profit. The administrative costs through December 31, 1958, are 2.5 percent of the total cost of care furnished. This is considered favorable.

With respect to the inclusion of deductible features in an insurance program such as the one proposed, we might point out that the Medicare Act outlines the type of charges that can be made when civilian facilities are utilized by a dependent. To some extent there is already a deductible feature built into the program, e.g., the first $25 of the hospitalization must be borne by the dependent or sponsor when hospitalized in a civilian hospital. If the period of hospitalization is less than 14 days, it is more costly to utilize civilian facilities in that in a military hospital they pay $1.75 for each day hospitalized. In those instances where dependents have no choice but to use civilian medical facilities, that is, where no uniformed service medical facility is available or accessible, it would seem to pose an inequitable situation to penalize such dependents who have no choice other than to use civilian facilities. The per diem rate insofar as dependent liability is concerned must be the same as the per diem rate charge when uniformed services facilities are used. Under the plan proposed, the additional deductible feature would be imposed on those residing some distance away from a military facility as well as those residing near a service facility. The proposal would impose an additional financial burden on any dependent who does not have access to a military medical facility to obtain required care or where a uniformed services medical facility is not able to furnish the care required.

Proposals to operate the medicare program as an insurance plan are not new. They have been suggested, studied, and restudied repeatedly. Every such study has resulted in adverse recommendations. The Department of Defense Advisory Committee on Medicare has also expressed an adverse opinion.

As matters now stand, the program as it actually operates at field level is now operated by insurance companies, Blue Cross, Blue Shield, and State medical societies. Since they operate under nonprofit contracts that are regularly scrutinized by the Army Audit Agency, there would not appear to be any advantage in changing administrative procedures at this level in the total administrative structure.

A belief that the use of insurance policies would produce economies is an error. No matter who paid the premiums—the Government, the patients, or both together, it is obviously necessary that the aggregate of all premium receipts be sufficient to pay all bills presented, plus the costs of administration. Under current conditions, funds made available by the Congress are insufficient to pay for a free-choice type of program. If the appropriation were divided up into small bits, called premiums, evidenced by pieces of paper called policies, it would still remain true that the redemption value of the policies in the form of care would be limited to the aggregate value of the premiums. Simply changing the name from appropriation to premium would add nothing to available funds.

In addition, there are several technical matters that invalidate the belief that an insurance plan is applicable to dependents' medical care. The fundamental truth is that there is no fixed universe of insurable risks. Both the "separated from sponsor" and "living with sponsor" groups have a continually changing membership. For many reasons families do not remain together or apart for predictable periods of time. Example: A man is moved, his wife remains behind to hold a job, to see children through school, to take care of sick parents. Or perhaps he moves overseas, or there is no housing at his new station, or he is on sea duty, or a hundred other things. Then conditions change, and family groups reform, and separated-from-sponsor dependents become living-with-sponsor dependents.

Complicating the situation is the fact that the service hospitals are and must remain the primary source of care for living-with-sponsor dependents; and the capacity of service hospitals differs widely, from place to place and from time to time.

Keeping track of such kaleidoscopically changing universe of dependents, their changing locations and changing eligibility, could of course be accomplished, but the paperwork would be tremendous in volume, and susceptible to errors, disputes and disparities at many points. In addition, administrative costs would be greatly increased.

In summary, the rapidly changing eligibility status of individual dependents makes it impossible to issue a medicare insurance policy to an individual with any certainty as to the future changes in the eligibility of the dependent and hence the permanent validity of such a policy. The obvious solution to this problem would seem to be the simple device of requiring the holders of such policies to have them validated for use by checking with a service hospital prior to use. This is precisely the procedure now followed in administering the permit system.

The final and fatal objectiou to the use of an insurance policy type of coverage is the fact that, in effect, it would in some ways put the administering insurance company on a coordinate level with the services in determining the extent and nature of care to be given to dependents. This would be wholly inadmissible.

The proposal to increase the amounts paid by dependents for care in civilian facilities incompatible with the principle of the act which is to relieve dependents of the cost of care as a fringe benefit contributing to good morale. If such an increased charge were on a flat amount basis the spirit of the act would be vitiated. If it were on a percent basis the dependent would be unprotected against catastrophic costs. Finally, an indemnity system would in effect undermine the whole system by depriving every sponsor of his feeling of confidence that complete care is available to his dependents. He would never know what protection to count on, from area to area, and even as between two physicians in the same area. An indemnity system would place a floor under costs, but no ceiling on them. This is very different from the present system in which there is a ceiling, but no floor to costs.

There is no indication as to how a group insurance plan would facilitate administration and reduce costs. It would appear to be far more costly and complex such as, the administrative costs of maintaining liaison with any civilian organization performing the function in order to insure that only eligible dependents of active duty personnel receive the medical benefits authorized under Public Law 569. Further, it could entail added costs to the Government if an insurance company undertook the program by reason of establishment of financial reserves and possibly profit.

Statement on What Motivates Wives in Seeking Civilian Doctors

With respect to the above query, we must demur to some extent since the implications of the question are somewhat misleading. That civilian medical facilities are preferred in some proportion certainly cannot be questioned. However, such preference can be attributed to many factors. Lacking a thorough public opinion study of the matter a ready and precise answer is not easy. We must rely on information gleaned from our correspondence and from our monthly questionnaire.

In this regard, it is interesting to note the results of a patient query based on 2,100 questionnaires sent out during the period September 1957 through December 1958. This study refers to patients who received all types of civilian care and treatment to include maternity benefits. About 78 percent of these questionnaires were returned completed.

Concerning reasons for choosing civilian medical facilities, the study revealed that approximately 42 percent stated that they resided too far from a service hospital. The last 900 questionnaires mailed asked for the distance from the residence of the dependent to the nearest service hospital. Of those who said that they reside too far from a service hospital (because of time, distance, or transportation factors) 92.4 percent lived 30 miles or more from a service facility. Nearly 80 percent resided at a distance of 50 miles or more.

Other reasons given for preference of civilian medical facilities, and the related percentages were as follows: (*a*) lack of interest and individual care from service medical personnel, 5.8 percent; (*b*) prefer the services of one physician rather than three or four different physicians, 5.4 percent; (*c*) felt they would receive better care, 4.9 percent; (*d*) were dissatisfied with service physicians, 2 percent; (*e*) stated type of care required was not available at the service hospital, 11.8 percent; (*f*) stated service hospital was inadequate or overcrowded, 9.9 percent; (*g*) preferred the services of a particular civilian physician or hospital, 7 percent; (*h*) received emergency care, 5.3 percent; and (*i*) stated merely that the civilian medical facility was more convenient, 3.4 percent.

The magnitude of the problem should be presented. Briefly, about 80,000 women a year appear to have selected civilian care in preference to service care. This is the difference between the 170,000 deliveries in service hospitals in 1956 and their 90,000 deliveries in 1958. From the sources of information cited above there appears to be several major considerations involved in the decision of maternity patients to use civilian facilities.

The use of civilian medical sources in large degree is motivated primarily because of geographic reasons. A sizable proportion of eligible maternity patients reside in areas where a uniformed services medical treatment facility is not readily accessible, and it reasonably follows that utilization of civilian sources of care by these dependents would be based on the fact of this inaccessibility.

Within this same reference, it may be stated that prior to the beginning of the program on December 7, 1956, required care, to include obstetrical services, was not available to a large percentage of the total dependent population due to their distance residency from an adequate service facility. The medicare program filled this definite need. It can be readily noted that the use of civilian facilities would not necessarily be attributed to mere preference, but rather to the fact that necessary care, heretofore unavailable due to circumstances of residence, for these individuals could now be provided at Government expense under a more uniform and equitable application of medical benefits to the dependent population as a whole.

We do not and cannot disregard the fact that many dependents do prefer civilian physicians and hospitals. It is indicated that this preference, in large part, extends to maternity patients who desire a single doctor-patient relationship that generally does not prevail in the clinical doctor-patient relationship or in the clinical outpatient setup in uniformed services facilities. As noted in Dr. Dobbins' letter, the care and professional capabilities existing in uniformed services facilities are certainly such that they would not be questioned. However, the close rapport established in a single doctor-patient relationship is precluded due to the necessary flexible nature of the uniformed services whose medical personnel are subject to performance of their primary mission of medical support to troops, and secondarily to the care of other eligible personnel authorized medical care from uniformed services medical facilities on a space available basis. Their primary mission requires periodic rotation to insure operational readiness and adequate state of training. Accordingly, this leads to situations wherein a military doctor is transferred from his patients resulting in a "clinic" situation which differs from the civilian community. It is recognized that many maternity patients do not relish a situation calling for different physicians to attend the same case.

It is realized, too, that even with many of those patients residing near a uniformed service facility, civilian care is preferred since transportation difficulties might be experienced, and where the services of a civilian physician located in the immediate area are available on a day and evening schedule. Particularly in the cases of working wives, evening appointments or weekend visits to civilian sources are preferred due to the circumstances of their employment. In some instances, far in the minority, dependents have expressed preference for civilian care stating that in their personal opinion, better care would be received.

To summarize briefly, the following factors are indicated to motivate wives in seeking civilian care.

First, many women strongly prefer a continuing, private, highly personal doctor-patient relationship during the entire period of pregnancy, delivery, and postnatal care. Service hospitals must use the relatively impersonal, more public, clinic with its frequently attendant changes in medical and ancillary personnel.

Second, many women want 24-hour telephone access to their physicians. This is impracical in a service facility.

Third, many employed wives find it necessary to use private physicians who have evening office hours or who will give weekend appointments.

Fourth, complete maternity care involves several visits to the physician. Especially during the later stages of pregnancy it is physically difficult to travel even relatively short distances particularly by public transportation which may involve transfers and delays. In addition, this prolonged public appearance is shunned by some. Normal local transportation problems may become very difficult for a pregnant woman. In most cases, it is easy to understand why they prefer a more easily accessible private physician.

Mr. SIKES. Thank you very much, gentlemen. It has been a real pleasure to have you before us. You have given us a lot of food for

thought. We appreciate your interest in coming here to discuss this matter with the committee. It is very important to us, too.

Continental Air Defense Program

WITNESS

F. W. GODSEY, PRESIDENT, ELECTRONICS COMMUNICATIONS, INC.

Mr. Sheppard. The next witness is Mr. F. W. Godsey, representing Electronics Communications, Inc.

We are running a little late.

Mr. Godsey. Thank you, sir. My statement will be brief.

I want to talk about a facet of national defense, and perhaps I should establish my competence before proceeding.

Mr. Flood. Mr. Chairman, did we invite this witness or did he ask to come?

Mr. Sheppard. It is my understanding he requested to come.

BACKGROUND OF WITNESS

Mr. Godsey. I have since 1940 been engaged in the development and manufacture of weapons and weapons systems. Prior to that, for 12 years I held an Inactive Reserve commission in the Navy. Strangely enough, I am more concerned now about some of the problems of the Air Force.

What I have to say does not have to do with the research and development, the missile, or the space program. There already has been so much said about them that there is no point in my commenting. I am deeply concerned with what appears to be a serious oversight in our planning and programing for the period roughly 1961 through 1963.

Mr. Flood. Mr. Chairman, could we have a paragraph of biography from this witness.

Mr. Mahon. Give us a little background, please

Mr. Godsey. I was an engineer by profession. I call myself an industrialist now. I spent the period from 1940 through the summer of 1956 with Westinghouse Electric Corp. and was a Vice President of Westinghouse when I resigned to assume the presidency of Electronics Communications, Inc.

Mr. Mahon. Where did you get your formal education and training?

Mr. Godsey. I am a graduate of Rice Institute in Texas.

Mr. Mahon. I happen to know that is one of the finest engineering schools in the United States, with very high standing.

Mr. Godsey. Thank you, sir.

Mr. Godsey. I had 2 years of graduate work at Yale.

Mr. Flood. Oh, well.

Mr. Sheppard. Flood has heard of that. Don't worry.

Mr. Mahon. I might hold it against you if you went to Yale, but Rice is OK. Proceed.

Mr. Godsey. Most of my business career has been in engineering and in the last 15 or 16 years in management.

May I go ahead, if that is sufficient as a biography?

Mr. Minshall. What kind of work are you engaged in now?

Mr. Godsey. We are primarily developers and manufacturers of electronics equipment, communications equipment.

Mr. MAHON. To what extent do you have contracts with the Government?

Mr. GODSEY. One-third of our business is civilian and two-thirds is military.

Mr. MAHON. Could you state approximately the gross annual volume of your business?

Mr. GODSEY. This fiscal year we will do about $30 million in sales.

Mr. MAHON. All right.

AIR DEFENSE PROGRAM

Mr. GODSEY. The major emphasis, at least in public and certainly in the circles that I associate with in the Defense Department, has been upon the long-range missile programs, and for reasons I do not feel I am competent to comment on, the emphasis on the Air Defense Command problems, the Continental Air Defense Command, and the Strategic Air Command, has been in large measure shifted, particularly as far as the Air Defense Command is concerned.

It is hoped that after 1963 we will have an adequate missile capability to defend ourselves, and also to exert massive retaliation if that should become necessary. However, my concern is with the period prior to 1964 and the threat that we face now and will face for the next few years is not from Russian missiles nearly so much as it is from long-range bombers, the equivalent of our own Strategic Air Command. The Russian air forces are being built at a very rapid rate. You see almost nothing of this in public comment.

We have quite recently in our planning dropped programs which would provide at least a partial deterrent to attack by such planes.

Our interceptor program for the Air Force, the Air Defense Command, has been terminated as of October of next year. The last interceptor is due to come off the assembly line at that time.

There is a follow-on interceptor, the F–108, which is in development, but certainly it will not go into production in time to fill a gap, during which period our present aircraft are wearing out. They do wear out.

I do not feel that I want the safety of this country gambled with in that fashion, to assume that we will not be attacked for a period of the next 3 years. The potential enemy has the ability now to hit us. We have only a limited ability to defend ourselves. We have a reasonable ability to strike back.

The words "minimum deterrent capability" are being used now. That also is a long-term gamble. I believe the interpretation of that is that we have only to stay in a posture where we can exert a sufficiently harmful retaliation to deter an attack upon us. I do not think any of us can outguess what the Communist world will consider a fair trade for the United States. To reduce our ability to completely devastate an enemy country to that of partial devastation is a gamble which I hope the United States will not take.

So, in brief, gentlemen, that is what I came here to say. I am sincerely convinced we cannot afford to run this risk, that we must maintain our defensive forces, and that we must maintain the ability for massive retaliation.

Mr. MAHON. Mr. Godsey, are you familiar with the problem of the defense of the continental United States and the military bases in the continental United States through the use of missiles, including the so-called NIKE series of missiles and the BOMARC missiles, A and B? What is your feeling with respect to this type of interception of aircraft?

Mr. GODSEY. I am quite familiar with BOMARC. I had something to do with the development of that weapon.

Mr. MAHON. What did you have to do with it?

Mr. GODSEY. When I was with Westinghouse, one of my responsibilities was the development of the target seeker radar in the nose of that weapon.

As far as NIKE is concerned, I am reasonably familiar with it through association with other Defense Department activities and with contractors who have been associated with that program, both Western Electric and Douglas.

My feeling is that they are both excellent weapons. They do not have either the range or the flexibility, however, that a manned interceptor has. We do not have enough bases for either NIKE or BOMARC, or combined, to eliminate the manned interceptor at this point in time. That may come, but I do not believe we can risk it. There are too many holes in the defense pattern through which attacking bombers can slip, particularly if they come in at low altitudes.

Mr. MAHON. The gravamen of your appeal here is that you want more interceptor aircraft now and during the period prior to 1964.

Mr. GODSEY. Yes, sir. I am very much afraid of a decrease in our defensive position prior to the end of 1963 or 1964.

Mr. MAHON. What is your evaluation of the relative merits of the NIKE series of missiles and the BOMARC? Since the BOMARC is partly your baby, maybe you would think it superior. There are some who feel we do not have any need for both types and that heads should be knocked together and we should procure only one or the other. Do you have any feel for that question?

Mr. GODSEY. You are about to get me into some trouble, sir, but I will try to answer it the best I can.

Mr. FORD. We are in trouble. We have to give the money one way or the other.

Mr. FLOOD. Both ways.

Mr. LAIRD. We are looking for help.

Mr. GODSEY. The long-range NIKE which is now in development will certainly overlap and supersede the early BOMARC series, but the longer range BOMARC goes out beyond NIKE capabilities. So this is a progression. First one has the advantage and then the other.

You may be expecting too much from me there. I do not believe you can at this time say that the NIKE bases should be abandoned and that all effort should be placed on BOMARC. And neither do I believe that all reliance should be placed upon the NIKE bases. The NIKE bases as well as BOMARC are tied in with the SAGE system. BOMARC, however, has already a developed capability for offshore operations, operations out of the SAGE system. The

ground equipment for BOMARC has been developed to the point where operations out of the SAGE environment are practical.

Further, the BOMARC has an extended range which the NIKE does not have. We need that range because we do not have NIKE bases in this country spotted close enough to each other all over the country to prevent an enemy attack coming through, particularly if they come in at low levels.

Mr. FORD. Will the chairman yield there?

Are you familiar with and would you care to comment on the HAWK missile, which is a low-level antiaircraft missile?

Mr. GODSEY. That is an Army development.

Mr. FORD. Yes. They say it will be operational in a reasonably short period of time.

Mr. GODSEY. That is, I understand, a relatively short-range device which should be very effective in defending point installations, but is not intended for area defense.

Mr. MAHON. The Air Force in the past, and probably today, has claimed that the only adequate defense is area defense, and that NIKE cannot do that job, whereas they claim BOMARC can. Do you have any feel for that question?

Mr. GODSEY. I think in a measure that is what I have been saying, except that I have qualified it by at least the indirect statement that NIKE is and should be most effective for limited area defense, and certainly for the terminal phase of any attack around a highly populated area, a highly industrialized area, NIKE should be effective.

MANNED INTERCEPTOR PROGRAM

Mr. MAHON. If you had the power to write the policy with respect to air defense at this time and for the next 2 or 3 years, what, in your opinion, would you do which is not proposed?

Mr. GODSEY. I would reinstate the manned interceptor program.

Mr. MAHON. What manned interceptors do you feel should be reinstated?

Mr. GODSEY. The F–101B and the F–106 were the two which were specifically canceled, leaving us with no new equipment beyond October of next year.

Mr. FLOOD. What about the day interceptor, the 104F, which has been slowed down, too?

Mr. GODSEY. Sir, I have very little faith in a weapon or weapons system with limited capability. If you cannot use it at night or in bad weather, then you have left yourself wide open to attack in those periods when you can do nothing. I believe the time in which a day fighter could be used has passed many, many months ago.

ICBM DEFENSE

Mr. MAHON. In view of your special interest in defense against possible attack by bombers, have you also considered the possibility of attack through the ICBM, which has claimed the interest of the minds of the people to a great degree in recent months?

Mr. GODSEY. Yes, sir. But I am here today not to complain about the ICBM program or the anti-ICBM program. I believe we are doing just about everything that can be done in that direction. But

I do not believe either we or the Russians can strike each other effectively with ICBM's for at least several years from now. It will take a tremendous number of launching sites and a tremendous arsenal of such weapons in order to mount an effective attack. You only have to look at the reliability factor currently in what is now the very early development stages of such weapons to realize that you cannot depend on getting a hit on a target even at relatively short range without firing a prohibitive number of missiles.

(Discussion off the record.)

BOMARC

Mr. FLOOD. As distinct from the question which Mr. Mahon asked you as to whether or not we should continue BOMARC, I am not asking my question with reference to that point, but with reference to BOMARC, I was concerned about the jurisdiction of the bird as between Army and the Air Force. The Secretary of Defense told me that he was keeping BOMARC in the Air Force jurisdiction and not in Army point-to-point defense, and the only reason, he said, he was keeping it there—otherwise he would agree with me—was because it was integrated with the SAGE system. Since it was integrated with the SAGE system, he did not feel he should impose it upon the Army jurisdiction, but leave it where it was.

You told Mr. Mahon that the BOMARC had a dual capacity, and I got that hint that it was probably better than the SAGE system.

Mr. GODSEY. I did not mean for you to understand it that way. What I did intend to say, though, was that BOMARC could operate in Alaska, for example, which is still out of the SAGE environment, I believe. It could operate in far North Canada. It could operate out of bases wherever we could establish such bases, perhaps Greenland, Iceland, Nova Scotia—wherever we could place such bases—without having to extend SAGE to those points.

Mr. FLOOD. A condition precedent to the successful operation of BOMARC is not integration with the SAGE system?

Mr. GODSEY. That is correct, sir. BOMARC can operate independently of SAGE.

Mr. FORD. The SAGE system is a very substantial project as you know.

Mr. GODSEY. Yes, indeed.

Mr. FORD. I think they are spending something like 3 billion-plus on the program.

The Army Missile Master program also is a fairly substantial program. Are you familiar with that program at all?

Mr. GODSEY. Not nearly to the extent that I am familiar with SAGE.

Mr. FORD. I have made no judgment, but I have wondered whether or not there is unnecessary duplication between SAGE and MISSILE MASTER. Would you care to comment on that?

Mr. GODSEY. I do not know enough about MISSILE MASTER. If it is too early in this development I should not comment. I do not have positive knowledge as opposed to what I do know about BOMARC.

RELIABILITY OF AIR DEFENSE WEAPONS

Mr. FORD. How do you compare the overall reliability of BOMARC, NIKE–AJAX and NIKE–HERCULES with these manned interceptors that you are concerned about?

Mr. GODSEY. I believe they have about the same order of reliability. The problem of vectoring an interceptor, whether it is manned or unmanned, against a target when the target and the interceptor both are traveling at high speeds, sonic or higher, is most difficult. It is an extremely difficult problem.

The principal advantage of the manned interceptor currently is somewhat longer operating radius, plus an ability to change the mission after it is in flight. There is that added flexibility.

If ground tracking radar stations pick up targets in such a fashion that it becomes desirable to change the attack plan after you have launched your aircraft or your missile, whatever it may be, then the manned aircraft does have the ability to change in flight. It is much more limited with BOMARC than it is with aircraft, I believe. With NIKE it is pretty much out of the question.

SOVIET BOMBER PROGRAM

Mr. FLOOD. You made a very surprising statement, at least to me, Mr. Godsey, with reference to the Russian bomber program. I believe you stated as a fact, at least you stated it is your belief, that the Russian bomber program is continuing progressively and being accelerated and developed, I suppose you mean in size, quality, quantity, and so on?

Mr. GODSEY. Yes, sir.

Mr. FLOOD. It is my impression, and we have been so advised by the very highest responsible combined intelligence that we get, that that is not so as a fact, and that it is the opinion of the agreed intelligence—are you aware of what the term means? It is agreed combined intelligence, the highest level of our intelligence, that the Russian bomber program has been cut back, is not being accelerated, and, on the contrary, for at least the last year and most probably 2 years its effort—I mean the Russian defense effort—is being channeled from bombers into ICBM missiles.

Mr. GODSEY. The information I have is exactly contrary to that, sir.

Mr. FLOOD. Why would you have any information or what sources would you have superior in value to the intelligence I have indicated we have received?

Mr. GODSEY. I have no——

Mr. BOYLE. That is not a proper question.

Mr. FLOOD. I think it is. I am asking the question.

Mr. BOYLE. It is such an odd question to ask him. Why not ask him the source of his information?

Mr. FLOOD. I prefer to ask him what I did.

Mr. MAHON. You see the question which has been raised. Take your time in commenting.

Mr. GODSEY. My sources of information are primarily through briefings of our own military, briefings to industry. I have no reason to question the accuracy of those briefings.

Certainly anything that has been said in those briefings, if correct, is known to the enemy. They have been very highly classified, however.

However, I can say this: It is my understanding that the Russians are currently producing heavy and medium bombers at a rate of approximately —— per month.

I do not know who edited the information you have quoted. I have no reason, however, to doubt the integrity of the information that I have received.

Mr. FLOOD. For your information, with the exception of the President of the United States, there is no other higher authority who could have advised us than appeared here before this committee, and so advised us along the lines I have indicated.

Mr. MAHON. We have had considerable testimony on the capabilities of the Soviet Union. I do not recall precisely what the testimony is except that we anticipate a considerable buildup in ICBM's, but insofar as I know it is not thought that the Soviet Union is abandoning its bomber program.

Mr. FLOOD. I did not get that impression, either. I have no impression that the Soviets are abandoning their bomber program.

The witness indicated that his information is that the Russians are accelerating the bomber program in quality and numbers, and I expressly use those phrases.

My impression from agreed combined intelligence is that that is not so as a fact—that they have retarded their bomber program and are emphasizing the ICBM program, not abandoning it.

Mr. MAHON. You agree they are emphasizing the ICBM program?

Mr. GODSEY. Yes, indeed.

Mr. MAHON. I think you would also agree that perhaps a couple years ago or more we thought the Soviet Union would have a tremendous heavy bomber program which did not materialize as rapidly as had been anticipated. You are familiar with that?

Mr. GODSEY. Yes, sir.

Mr. MAHON. Now, in view of our downgrading of their program of 2 or 3 years ago, you are speaking of a present evaluation as to what they do from here on, and you understand that they will accelerate their bomber production program?

Mr. GODSEY. No, sir. I would like to correct that. I did not intend to say accelerate their program.

I understand, however, that they are currently producing at a rate of about —— long-range and medium bombers per month. This is enough to frighten me.

I do not know how many they were producing 3 years ago. It may have been more or less, but certainly —— new bombers per month is not a cheerful prospect.

Mr. FLOOD. Off the record.

(Discussion held off the record.)

Mr. MAHON. Mr. Godsey, it has been a pleasure to have you here before the committee.

All citizens, whether they recognize it or not, are tremendously interested from the standpoint of taxes and from the standpoint of personal survival, in the question of defense. It is good to have citizens come before the committee at their own expense from their

places of business for the purpose of trying to make their wishes known in fields which are important to the country.

Mr. GODSEY. Thank you, Mr. Chairman.

Mr. MAHON. The staff will give you an opportunity to edit your statement.

EXCESS NUMBER OF DIFFERENT MISSILES

Mr. BOYLE. Mr. Godsey, I am under the impression that we are getting about as many types of missiles as Carter has pills. Do you feel that observation is somewhat accurate?

Mr. GODSEY. Yes, I do.

Mr. BOYLE. As I sit here and listen to the descriptive names of these missiles I think we are getting about as many names as Heinz has with his 57 varieties. Do you feel that observation is accurate, also?

Mr. GODSEY. Yes, sir. Mr. Congressman, there is a great deal of competition between various groups and between various industry segments, and it leads to this sort of thing.

Mr. BOYLE. I do not have the technical background to evaluate the components of these various types of missiles, but I am asking you, from your experience and technical knowledge, is there a great number of the same kinds of working parts in most of the missiles?

Mr. GODSEY. In general, yes, sir, although they differ in many small details. The difficulty of designing components for missiles, or aircraft, for that matter, because of small differences in performance characteristics and requirements, the serious limitations on space and weight, almost always imposed detailed differences from one component to another, so that you cannot establish a central warehouse with, say, an inertial guidance system for all missiles.

In general, they have similar characteristics and many of the small detailed pieces are the same, but a component as such, something the size of this jar, for example, for one missile would be different in many small detailed points from a similar device in another missile or aircraft.

Mr. BOYLE. Off the record.

(Discussion held off the record.)

Mr. BOYLE. No further questions, but I do want to make the observation that I am very much impressed when people and businessmen in general show more and more interest in the conduct of their Government and I appreciate your taking time from your business to come down here. It has helped us a great deal.

Of course the fact you may have a primary interest in getting some business, which is wholesome is not overlooked but I feel it surely is not your exclusive reason for coming here.

I feel you are very much public spirited and I commend you.

Mr. GODSEY. Thank you, sir, and thank you for the opportunity to appear.

I would like to say in connection with that last comment of yours that I came here with considerable reluctance because some of the things I intended to say, and certainly the answers to some of your questions, are of a highly controversial nature and this could do me more harm than good.

AIRCRAFT MAINTENANCE

WITNESS

THOMAS WOLFE, AIRCRAFT SERVICE ASSOCIATION

Mr. MAHON. We are pleased to have before us at this time Thomas Wolfe of the Aircraft Service Association.

Your suggestions, Mr. Wolfe, have been quite helpful to us in the past. We are pleased to have you before the committee today.

Will you proceed in your own way?

I understand you are going to talk to us about aircraft maintenance.

Mr. WOLFE. Yes, sir. I am very glad, Mr. Chairman, to have the opportunity to be here. This is the first time our industry has appeared before your committee and we really appreciate this invitation.

The Appropriations Subcommittee on Military Appropriations for the House has undertaken rather extensive research into the problems of aircraft maintenance, and industry is very grateful. Your committee for the past 2 years have really gone into this more thoroughly than at previous times.

A summary of the scope and purposes of the Aircraft Service Association is attached to this statement, together with my qualifications as spokesman on their behalf. You will perhaps note, that while we are small in numbers and size as well as the figures in which we dwell today as compared to the multi-billion-dollar budget, we present in this testimony for your consideration a serious threat to the aircraft maintenance industry. If this trend in Government workshop competition were to be applied to the total military inventory annual maintenance cost of $7 billion, it would be a similiarly serious threat to the basic free enterprise foundation upon which our national defense depends.

The aircraft maintenance requirements represents probably the largest single share of the $7 billion maintenance fund for the total military inventory.

We believe aircraft will figure out to about 25 percent of the total.

The position of the Aircraft Service Association, presented in this testimony, is strongly supported by practically all trade and business organizations, large and small, who are familiar with this issue. This position includes, among others, the National Aviation Trades Association composed of 400 companies engaged in aircraft maintenance throughout our country.

INDUSTRY DETERIORATION—GOVERNMENT COMPETITION

The professional aircraft maintenance industry upon which our Nation and the military depended during our wartime emergencies suddenly found its military workloads reduced during fiscal year 1958 to 32 percent of capacity. During this current fiscal year 1959 program, 36 percent of the contractors have been required to completely shut down their military contract plants which has put thousands of skilled employees out of work.

The total funds requested by the military and approved by your committee for fiscal year 1959 contract maintenance appears to be ample to insure a healthy industry.

We are not here to ask for more money to support industry. Our mission at the moment concerns the application of these funds.

There is no evidence, however, that the approved funds are being spent for the purpose requested. An industry survey, while admittedly not complete, could identify only 31 percent of the total funds requested as being contracted. It is in this area that industry believes Congress should stipulate, as in the MATS appropriation, that when money is approved for competitive contract, overhaul and maintenance purposes, it be so spent and not used in other ways.

(The following report was submitted for the record:)

THE AIRCRAFT SERVICE ASSOCIATION,
Pasadena, Calif., September 15, 1958.

THE FISCAL 1958 AIRCRAFT CONTRACT MAINTENANCE REQUEST FOR PROCUREMENT SURVEY

FINAL REPORT

Significance

For the first time, following written request from both House and Senate Appropriations Committees of the 85th Congress, the military departments submitted a breakdown of their fund allocations relating to aircraft contract maintenance and Government workshop expenditures.

The results of their survey is a shocker to our industry which has been suffering one of the largest down-cycle workload for many years. Needless to say, if the $329 million is being contracted (exclusive of modification) there certainly are ample sums to support a healthy industry. But this industry is not healthy so where does this money go?

Twelve major companies (eight members and four nonmenbers of TASA), responded to our questionnaire No. 6 which was designed as an attempt to get the facts. The results, which are attached, indicate the following:

1. Only 18 percent of the total appropriation can be identified and by interpolating this, is raised to 31 percent of the total. (The reports themselves contain estimates in some cases.)

2. Could it be possible that industry could account for only less than one-third of the dollar amounts—or could it be that these funds are not contracted as the military requested from Congress and Congress approved.

3. Should TASA pursue its search for accurate information further by requesting Congress or the military buying agencies for a list of fiscal year 1959 contracts? Should we ask for fiscal year 1959 planning at the same time? Can the House field investigation bring this situation to light?

Please advise me of your comments.

THOMAS WOLFE, *Executive Director.*

REQUEST FOR PROCUREMENT SUMMARY AS REPORTED IN TASA SURVEY NO. 6 BY 12 COMPANIES COMPILED, SEPT. 11, 1958

Number of contracts and/or RFP's reported

	Last half 1957	First half 1958	Total, fiscal year 1958
USAF:			
Air frame	23	24	47
Engine and accessories	19	21	40
Parts, accessories, and miscellaneous	38	67	105
Army, general	19	24	43
Navy, general	2	6	8
Other:			
Government	4	7	11
Not separated			16
Total	105	149	270
Contracts canceled	11	5	16
Awards identified			84

Contract value analysis

[Millions]

	Last half 1957		First half 1958		Total, fiscal year 1958	
USAF:						
Frame	(10)	$8.86	(24)	$25.55	(34)	$34.41
Engine and accessories	(11)	9.91	(13)	6.14	(24)	16.05
Parts and accessories	(8)	1.65	(15)	.74	(23)	2.39
Army, general	(7)	1.25	(5)	.77	(14)	2.02
Navy, general			(3)	.45	(3)	.45
Other:						
Government	(3)	2.10	(2)	.04	(5)	2.14
Not separated					(16)	1.76
Total		23.77		33.69		59.22
Percent by fiscal half		40		60		100

Contract analysis

RFP's	Number	Percent
RFP's reported in survey	270	100
Contractor award identified	84	31
Contract valuation reported	120	45

[Dollars in millions]

	Contracts reported	Total volume	Value each
U.S. Air Force:			
Air frame	34	$34.41	$1.000
Engines and accessories	24	16.05	.670
Parts and miscellaneous	23	2.39	.104
Army, miscellaneous	13	2.02	.155
Navy, miscellaneous	3	.45	.015
Government, nonmilitary	5	2.14	.430
Not classified	16	1.71	.107
Total	120	59.22	.493

Fiscal year 1958 contract maintenance funds	Amount	Percent
Fiscal year 1958 contract maintenance funds as reported by Congress	$329	100
Survey: Interpolated (207×$0.493)	102	31
Balance not accounted for	227	69

Since the above contract fund allocation as reported by the military for fiscal year 1958 excludes modification, where is the other $227 million?

USAF—AIRCRAFT—1957

Date	Source	Quantity	Type of work	Estimated volume	Award
July 16	DOD	51	F94C, IRAN & MOD	$841,000	Canceled.
July 15	SWAMA	290	T33, IRAN		Do.
Aug. 9	AMC	19	H19, IRAN		
Aug. 21	SWAMA		RC121D, IRAN		
June 27	AMC	71	T29, IRAN		Do.
Sept. 24	AMC	47	C124, Ch. IV & E MOD	586,000	AMCO.
Aug. 9		19	H19, Heli, Iran		Canceled.
July 9		15	C54, Tank Seal		
Nov. 5	SWAMA	60	F86F, Rehabilitation	1,196,000	N.A.
Nov. 8	SWAMA	98	F86D, Rehabilitation	2,328,000	N.A.
Nov. 19	SWAMA	368	T33, IRAN & MOD	1,700,000	G.C.A.
Dec. 6	SBAMA		C54, Tank Seal	501,000	SCA.
Dec. 9	SBAMA	2	C118, IRAN & T.S	60,000	So. Cal.
Dec. 9	SBAMA	4	C54, IRAN & T.S	100,000	Do.

USAF—AIRCRAFT—1957—Continued

Date	Source	Quantity	Type of work	Estimated volume	Award
Dec. 31	NAAMA	19	H19, Heli. IRAN		Canceled.
July 19	AMC		C131A, MATSAM	$109,800	AEMCO.
Aug. 9	AMC	54	F80C	1,438,000	AEMCO.
June 5	AMC	64	C118, McGuire		Flite, Ent.
June 5	AMC	56	C124, Dover		Air Mod.
June 3	SBAMA	20	C47-117, IRAN (128 Red.)		PAC.
June 25	AMC	50	F85		Canceled.
June 25	AMC	87	F89		Do.
Aug. 3	AMC	51	F94		
July 20	NAAMA	27	C123B		Fairchild.
Aug. 3	SWAMA	100	F86H		Canceled.
Aug. 16	SWAMA	100	F86D		Do.

USAF—ENGINE & COMP.—1957

July 10	OCAMA		Eng. Comp	$56,000	
July	AMC	1,400	J33 OH	2,600,000	SAC.
July 10	AMC	930	R2800 OH	2,300,000	Aerod.
July 18	OCAMA		Pump Assem	144,000	
July 19	OCAMA		do	150,000	
July 23	OCAMA		Assemb	25,000	
July	AMC		R2000 OH	1,700,000	
Aug. 6	OCAMA		Parts & Acces	28,000	
Sept. 30	NAAMA	750	R1600	1,200,000	Do.
Nov. 12	NAAMA	450	R1300	450,000	Do.
May	AMC	584	R1830		NWA.
Do	AMC	1,348	R2700		Aerod.
Do	AMC	674	R2000	1,250,000	OAM.
Do	AMC	452	R2000 Reclaim		OAM.
Do	AMC	673	R1300		
December	SAAMA	1,438	R1830		
Do	SAAMA	360	R1830		
	AMC	2,200	R1830		Canceled.
	SAAMA	800	R1830		DAM.

USAF—PARTS, ACCESSORIES, AND MISCELLANEOUS—1957

July 10	SBAMA		OH C1 01D Comp		
July 2	AMC		C131B, Dev. & Eng		
July 16	AMC		Purifier, Mt. Acid		
July 19	SBAMA		Tank Seal		
July 23	OGAMA		Tow Targets		
July 25	OGAMA		do		
July 29	St. Louis		L20 Crash Rep		
Do	SBAMA		Sea Rescue Instal		
Aug. 6	OCAMA		OH Various Assemb		
Aug. 7	SWAMA		F94C Radome Test		
Aug. 9	OGAMA		Tow Target, BiStates		
Aug. 7	SAAMA		O&R—Various Comp		
July 23	OO AMA		Training Set		
Aug. 9	OC AMA		Tray Assemb. B50		
July 2	McGuire		OH, Access. & Assem		
Do			C131B, Engineering		
Sept. 4	Dover		Dover, Access		
Oct. 9	AMC		F94, Cockpit Instal		
Oct. 14	AMC		do		
Oct. 15	WR AMA		Kit Mod		
Oct. 16	SWAMA		Fuel Tank, R&M	$525,000	Airepair.
Do	SBAMA		OH O5G Comp		G.E.
Oct. 28	MO AMA		Instra. Instal		
Oct. 30	OO AMA		do		
Nov. 1	SWAMA		RC121, Radome, Rep		
Dec. 23	SA AMA		Control Panes		
Dec. 2	SAMA		OH C1 03C Equip		
Dec. 4	OOAMA		Fab: Tow Target Parts		
July 20	Hickman		MATS Comp		Canceled.
Oct. 22	TTAF	6	Training on T33	3,153	AEMCO.
Nov. 19	SWAMA	72	Generator Sets	59,000	Mitchel.
Dec. 25	SHAMA		Actuator & Gen		
Nov. 25	Godsden		Heaters		
Dec. 11	do		Compass & Dump		
July 19	AMC		Communication Fld. Ser	7,200	RCA.
Sept. 26	AMC		Rome AFB Fld. Mard	588,000	Bendix.
Nov. 12	SWAMA		Fuel Tanks		Aerepair.
Do	McChord		C118-124 Clean		
July	OCAMA	4,100	Fuel Controls	325,000	C E Co.
Do	OCAMA	32,164	Fuel Nozzles	65,000	G.E.
Aug	OCAMA	1,200	G33 Comp	75,000	SAC.

U.S. ARMY—MISCELLANEOUS—1957

Date	Source	Quantity	Type of work	Estimated volume	Award
July 3	Ft. Ord		H21, H23, L23 F.M.		Canceled.
Aug. 23	Ft. Riley		Fld. Maint	$56,000	
Mar. 28	Sig-Phil	21	H34 Heli		
Apr. 23	Sig-Phil	14	L20 A/C		
Apr. 26	Sig-Phil	79	L19 A/C		
May 24	Sig-Phil	4	H21 A/C		
Oct. 30	St. Louis		H19 A/C		
February	TSMC	576	O-470-11 Eng		
Do	TSMC	53	L19A A/C IRAN		
Do	TSMC	277	O-355-5 Eng		Aero Corp.
March	TSMC	336	R985		
Do	TSMC	50	O-435-23A Eng		
Do	TSMC	311	O-335-6 Eng		
April	TSMC	7	H25A A/C		
Do	TSMC	29	R1340-59 Eng	30,000	P&W Co.
May	TSMC	30	H23 A/C Maint		
August	TSMC	74	R1300 Eng	90,000	C/W.
	TSMC	27	R1340-57	28.000	
	TSMC	21	H21 Heli	110.000	
	TSMC	257	T1830-103	600,000	C/W.
	TSMC	17	H21-123	40.000	
Dec. 23	TSMC	1	Heli-Crash	10,000	GCA.

USAF—AIRCRAFT—1958

Jan. 16	NAAMA	14	P2Y, Rehab	$950,000	GCA.
Jan. 21	Mid	30	C123, Mod	60,000	Fairchild.
Jan. 23	SWAMA	4	T33 IRAN	54,000	GCA.
Jan. 16		13	F80C, Rehab	325,000	AEMCO.
Jan. 13	McCord		C118-124, Fld. Maint	96,000	Landair.
Feb. 14	SBAMA		C54, Kit Instal		
Mar 3	Hickman	1	T33, IRAN	8,140	H.A.L.
Mar. 12	Larson AFB.	1	Aileron		
Mar. 14	SWAMA	4	T33 Crash Dam	70,700	AEMCO.
Apr. 18	AMC	25	C121 MATS-Sam Ch		
Apr 24	MOAMA	8	H19 IRAN	240,000	
March	SBAMA		C124 IRAN		
April	MOAMA	80	SA 16 IRAN		
Apr. 29	SWAMA	22	T28A, Rehab. & Insp	82,000	LAC.
April	SWAMA	26	RC121, Phase I Mod		
April	SWAMA		C1219 PARC & M & M		
Apr. 7	MAAMA	50	C119, TOC	81,200	AEMCO.
Apr. 10	MOOAMA	8	H19, Supt. & IRAN		
Apr. 4	AMC		World Wide Field Team	12,000,000	Landair.
Apr. 25	SWAMA	1	T33, IRAN Damage	15,700	AEMCO.
May 1	SBAMA	75	C124, IRAN	4,000,000	
May 2	Larson	30	C124, Painting	118,300	AEMCO.
April	SWAMA	22	T28A, Rehab	91,000	LAC.
July 20	AMC	71	T29 A-D, IRAN	1,444,000	Canceled.
July 19	AMC		C131, MATS-SAM	53,000	
July 31	AMC	290	T33, IRAN & Mod	2,008,000	Do.
Jan. 21	McCord		C118, L124, Base M	100,000	Landair.
June 12	Brookley	71	SA-162 IRAN	1,400,000	Postponed.
June 24	AMC		C97 & C124, IRAN		
June 24	McClellan		C121G, Progr. OH		
Jan. 24	McCord		C118-124, Base M		
Feb. 24	Olmsted	30	C123B, Mod	175,000	
May 2	WPAFB		Field Maint		
May 19	AMC		C124 F. M. Charleston		
May 13	SBAMA	5	VC47 B, IRAN	44,600	PAC.
June 3	SBAMA	75	C124, IRAN	2,139,000	Hayes.
April	SWAMA	5	VC 47, Interior		PAC.

USAF—ENGINES & COMP.—1958

Jan. 16	SAAMA	796	R 1830 & Comp	$1,500,000	
Apr. 10	OCAMA		J35, I47, Eng. Comp		DAM.
March	OCAMA		J33, CL021		
April	SAAMA		Eng. & Acces		
Do	AAAMA		R985		
Do	SWAMA		J69-T9 & T19		
May	SWAMA	56	R985	50,000	
Do	OCAMA	2,018	Valves, Various	14,000	SAC.
Do	OCAMA	2,100	J33 Comp	197,000	1—SAC.
Do	OCAMA	30,000	Fuel Contr	80,000	1—SAC.
Do	OCAMA	2,050	Turbine Fan Assem	100,000	
Do	OCAMA	30	Const. Speed. Turb	3,000	
Do	SAAMA	363	R2000, Reclaim		

USAF—ENGINES & COMP.—1958—Continued

Date	Source	Quantity	Type of work	Estimated volume	Award
Sept. 4	AMC		M&M, Field Sev	$1,500,000	
Apr. 30	AMC		Electronics Eng	750,000	
May 10	OCAMA		Valve OH	120,000	
Jan. 16	SAAMA		do		
May 19	WRAMA	7,170	Propellers	150,000	BOBB.
May 29	WRAMA	310	do		Canceled.
June 3	Mallory	150	Packette Eng		
June 30	do	804	Lycoming		
	AMC	316	R2600	800,000	Aerodex.
	AMC	350	R3350		Canceled.
	AMC	300	R4360		Do.
	SAAMA	674	R2000	800,000	TOA.

USAF—PARTS, ACCESSORIES, AND MISCELLANEOUS—1958

Jan. 6	OCAMA	5,700	Pump Assemb	$26,000	Van Gilder.
Jan. 14	Mid AMA		105H-F-G		
Do	Olmsted	8,900	Instruments	69,000	6 Comps.
Jan. 13	Robins	7,100	Prop. Assemb	99,000	Bobb.
Jan. 14	Ogden AMA.		Class 6920 Parts		
Do	OCAMA		Air Driven Comp		
Jan. 15			Tube & Hose		
Jan. 22	AMC		Dev. Similar Equip		
Jan. 24	SBAMA		FAB. 01D Items		
Jan. 25	SBAMA		Furnishing old items		
Jan. 31	SBAMA		Kit Fab, IA, IE, IC-54		
Jan. 29	Mid AMA		Class 05 Intr. Rep	6,487	
Jan. 20	OOAMA		Fab.—MB-1—Tank	600	Kelco-United.
Jan. 23	WR AFB		L17, Prop. Assem	2,825	Bobb.
Jan. 30	WR AFB		Blade Assem		
Feb. 3	SBAMA		Mfg. 01D Comp		
Feb. 7	SAAMA		0H Class 01H		
Feb. 10	SAAMA		IRAN, Radomes		
Feb. 12	SBAMA		Mfg., C124 Comp		
Feb. 18	SAAMA		0H, Class 01H Comp		
Do	Mid		Repair Cl. 05 Instr		
Feb. 11	Mid		Repair Cl. 059 Instr		
Feb. 14	SBAMA		C54 Wiring Kits	1,792	Ord-Air.
Feb. 21	SAAMA		0H Wiring O/H Comp		
June 27	MAAMA		Rep. Wiring 05 Inst		
Feb. 23	NAAMA		0H, Comp		
March	OCAMA	4,420	Hydral. Pumps	67,000	
April	OCAMA	1,100	I35 Comp	97,000	SAC.
Apr. 10	OCAMA	895M	Parts Mfg		
Apr. 3		7,527	Valves		
Mar. 14	OGAMA		Trainer Panel Mockup		
Mar. 19	OGAMA		Assemb., Cam. & Prop		
Mar. 27	WRAMA		Rep. Cl. 03A Equip		
Mar. 6			Wash & Br. C131 A/C		
Mar. 17	Larson		C124 Activators		
Mar. 14	Hamilton	20	Truck Cover, Fab	2,138	AEMCO.
Mar. 19	Larson		C124 Activator		
Apr. 4	AMC		F. T. Serv.—M&M		
Apr. 10	OOAMA		Gyro Demo		
Apr. 12	OOAMA		F84 Radome Assemb		
April	SWAMA		C/RC-121 Radome		
Apr. 23	OCAMA	1	WB50 PARC Proto		
April	SBAMA		C54 Rear Cargo Door		
Do	WRAMA		OH 03A Items		
Do	MOAMA		OH Turbine Starters		
Do	SAAMA		OH Relays		
May 5	WRAMA		Prop. Assemb. OD		
May 17	WRAMA		Prop. Assemb. OD		
May 21	NOAMA	4,070	Turbine Starters		
Do	Travis	6	Student Training		
May 29	OCAMA		Fuel Pump Assemb		
June 6	Hamilton		Alum. Truck Cover		
June 11	OCAMA		Fuel Valve		
May 5	OCAMA	6,550	Valve OH		
May 9	OCAMA	1,306	Hyd. Valve OH		
May 7	Hamilton	4	Fab: Alum. Truck	2,200	AEMCO.
May 13	do	10	Fab: Truck Cover	1,400	AEMCO.
July 31	SBAMA		Tank Reseal	39,000	Canceled.
February 7	AMC		Tech. Services FX 58	168,000	Emerson.
Do	AMC		Mil. Assist. Prog. FX 58	112,000	Nat. Science.
April 4	AMC		do	14,000	Madigan.
April 29	AMC		OCAMA Eng. Service	Open	
May 6	AMC		SWAMA Eng. Service	Open	
May 13	Travis		Wash Rack Corr		
May 19	Larson		do		

USAF—PARTS, ACCESSORIES, AND MISCELLANEOUS—1958—Continued

Date	Source	Quantity	Type of work	Estimated volume	Award
May 15	Castle		Washing—Various		
May 16	Dyess		do		
June 4	McCord		do		
Do	Olis		do		
June 12	Air Mod		Maintenance		
March 17	Dyess		Wash—Bright		
March 13	AMC		do		
April 11	AMC		Wash—Bright Dover		

ARMY—MISCELLANEOUS—1958

Jan. 16	A2		Support, Cover		
Mar. 21	St. Louis		IRAN		
Mar. 6			Mod. & SCAMP A/C		
Do	Ft. Hua		Field Team Maint		
March			Rubber Sections		
Do			Radio Kit Instal		
April	Fr. Aisl		Mfg. Rings & Castings		
Mar. 28		50	Fld. & Depart. Misc. A/C		
June 20		16	H34 Hel., Scamp. Maint		
Do		31	do		
Do		38	do		
June	St. Louis		R1300 Eng	$500,000	Aerodex.
May 7	Supt. Phil	102	Fab. Radio Kits		
May 9	St. Louis	100	Heli-Rotors		
1957					
	St. Louis	21	H21 Heli	110,000	
March	Signal		A/C Maint. Ft. Huochua		
Dec. 13	St. Louis		Cyl. & Pist. Assemb	4,500	Aerodex.
Sept. 12	TS & MC		H19 Crash Damage	27,700	GCA.
Sept. 24	Signal		Fab. Receiver Assemb		
Sept. 16	Supply		Fab. Maint Assemb		
Sept. 10	do		Fab. Cord Assemb		
Sept. 24	do		Fab. Bus Bars		
Do	do		Mfg. Hardware		
Nov. 8	St. Louis		Engineering Services		
Nov. 18	TS & MC		Call Contract		
Nov. 5			Transmitter & Lighting Unit		
Dec. 2			Control Box & Kit		
Oct. 8			Engineering Services		
Aug. 26	St. Louis		R1300 Eng	90,000	

NAVY—TOTAL—1958

Jan. 7	BuAer		Radio Field Installation	$16,000	Landair.
March			R5D, Tank Seal		
Do	Train. Ctr		Devise X3G41		
Apr. 22		4	R5D, Tank Seal	225,000	
Feb. 20	BuAer		Field Instal. Services	213,000	
May 5	do	4	R5D Tank Seal, Wash		

NAVY—TOTAL—1957

Aug. 8	Train. Ctr		Training & Cockpit Proced		
Dec. 11		8	R7V PARC Maint		

GOVERNMENT AGENCIES—MISCELLANEOUS—1958

Mar. 20	CAA, Hul	1	OH C54	$41,280	TOA.
March	ATC		Ram. Jet. Train		
June 12	CAA	1	C54D M&R		
June 11	CAA LA	1	Beech, Paint	381	AEMCO.

GOVERNMENT AGENCIES—MISCELLANEOUS—1957

Date	Source	Quantity	Type of work	Estimated volume	Award
Nov. 18	Dept. Int	1	G21-A Damage Rep		
Dec. 17	MDAP		T33 Training Course		
Oct. 8	Nat. Gd	1	T29 Mod		
Dec. 17	Mgr. Ser	1	C54D IRAN		
Aug. 27	CAA-Hnl		Access. & inst	$735	AEMCO.
Aug. 20	TS & MC		Maint. Ft. Rucker	921,000	Sou. Air.
Aug. 25	Ballistic Mis.		Instramutator, Cooke	1,210,000	Aerojet.
			USAF (DATE UNKNOWN)		
	WRAMA	1,500	Propellers	30,000	
	OCAMA	2,400	Tail Cones	75,000	DAM.
	SAAMA		Accessories	30,000	Howard.
	SAAMA		Surface Cont	60,000	Canceled.
	OCAMA	6,000	Pumps	80,000	DAM.
	OCAMA	4,690	Tail Cones	150,000	Slick.
	OCAMA	10,000	Do	30,000	
	IAAMA		Actuators	10,000	
	IAAMA		Accessories	15,000	
	IAAMA		Control Surfaces	100,000	DAM.
	OCAMA	5,700	Fuel Pump	100,000	
	OCAMA	12,000	Do	180,000	
	OCAMA	700	Hyd. Pump	14,000	
	OCAMA	3,500	Do	150,000	
	OCAMA	10,500	Jet Tail Cones	285,000	
	WRAMA	1,327	Prop. Assemb	185,000	

I realize there are exceptions. Naturally no one wants to set up a mandate to spend money that is not needed to be spent, and, of course, there are emergencies which arise which require a shifting of funds, but by and large, if the program is followed, barring exceptions, we feel that is the way Congress wants it, the way the military from the top levels have planned their program and the way they presume it should be funded.

A survey on this subject, conducted by the Senate Appropriations Committee during the past year, showed that the military has built their industrial-type aircraft workshops, 53 in number, to an investment level of $3.8 billion employing 153,802 skilled civilians in the shop and supply phase. This condition is even a more glaring example of Government competition with private enterprise than the MATS case wherein Congress found it necessary to establish, by mandate, a formula for the military to follow. This case deserves similar action. A copy of this report is available for the record if desired.

NAVY POLICY

Your committee made a rather searching investigation during the fiscal year 1959 hearings and admonished the Navy, which historically has been the biggest offender of the approved congressional air power policy in this respect, for not competitively contracting more of its workload.

Several years back, Congress and the President, after many hearings and investigations, established an air power policy, which is a matter of record. At that time they stated that private industry had a very important part to play in the whole aircraft picture, and in particular with aircraft maintenance. The Navy has not adhered to that particular policy.

The Navy has improved its contract program as submitted in the fiscal year 1960 budget now under consideration which is appreciated but the 16 percent of total overhaul funds is still far below the Army and Air Force. Industry recommends that Congress require the Navy to increase its contract workload to the percentage level of the other two services.

ARMY AND AIR FORCE POLICY

The Army and Air Force top level policy of sharing their workload with industry is most commendable.

We think both of those services are doing a good job in sharing this workload. It appears, however, that within the lower reaches of some commands this policy is not carried out because of other considerations.

CONFLICTS IN PHILOSOPHY

There exists very definite cleavages in philosophy below the DOD and Chiefs of Staff level relating to aircraft and missile maintenance and overhaul, as follows:

A. DISPERSAL VERSUS CONCENTRATION

Certain commands argue that huge Government-owned workshops, at the cost of hundreds of millions of dollars, must be built and maintained to effectively support military consideration and thus concentrate our defense assets in well-established target areas.

Other commands ask and are granted hundreds of millions of dollars to disperse aircraft out of target areas.

In other words, you have the O. & R. depot advocates who claim it is necessary to have these airplanes confined within the Government-owned workshops for military reasons, and then another command, such as SAC, comes along and says they have to disperse our aircraft and they ask for several millions of dollars more for new airports. This does not seem consistent because the large depot certainly is a target area well known to the Russians, and to put all these aircraft in these areas and concentrate them for military purposes does not make sense, if it is necessary on the other hand, to disperse them to many areas in order to diminish this concentration. There are dozens of empty industry shops that can disperse aircraft in-work without added cost to the taxpayer.

B. GENERAL VERSUS PERIPHERAL WARFARE

One element says that the war will be decided in 72 hours and all aircraft grounded for overhaul must be in the O. & R. depot; that the need for a mobilization and assistance from private enterprise does not exist.

Another element takes the opposite view.

We all know that an airplane that goes into overhaul, where it is torn down, can never be put together for any practical purpose to offset this 72-hour blitz, so the depot concentration reasoning here does not make sense so far as we are concerned.

C. GOVERNMENT COST VERSUS INDUSTRY COST

One element says the noncompetitive Government workshop, with civil service incentives, can do the job cheaper.

Another element defends the concept of free enterprise and lower costs, better quality, through the process of competition.

In the hearings before the Senate one military service says it costs about twice as much for commercial operators, the Navy particularly made that statement, and then another military service, the Army, comes along and say they buy from both and it is cheaper in the commercial shop. That question has not been resolved by independent audit, but most of us have pretty clear-cut ideas on it.

Mr. MAHON. There has been considerable objection to the removal of O. & R. activity from the Navy to civilian facilities.

Mr. WOLFE. No doubt, Mr. Chairman. While you were called to the telephone I mentioned the fact the Navy has improved their sharing-with-industry position this year and I understand they are discontinuing Corpus Christi.

Mr. MAHON. That was bitterly fought by the people at Corpus Christi, you know.

Mr. WOLFE. I can understand that.

Mr. MAHON. I assume it is your view that this was in the overall best interest of the taxpayer?

Mr. WOLFE. We feel in order to obtain the efficiency desired the Navy should have more competitive measuring sticks with industry whether they have enough or not enough in the way of numbers of depots.

The Navy has had very little in the way of efficiency measuring sticks now. Last year they did not request a single dollar for new aircraft maintenance contracts. They share about 10 percent now, but I understand in the fiscal year 1960 budget they will up this to 15 percent of their total dollars for contract maintenance.

The other services have been batting consistently around 45 percent, so we feel the Navy has quite a way to go yet.

Thus, there are those who would, under the cloak of military necessity, destroy private enterprise and the attendant competitive system which Congress, the administration, and the Department of Defense have consistently sought to preserve as necessary to our national defense. We request this committee to reaffirm this free enterprise policy in connection with the fiscal year 1960 budget, and determine if funds are being diverted from contract maintenance to other purposes.

This is perhaps the most important point I would like to emphasize to this committee. I will elaborate a little further.

Mr. FORD. Do you mean that funds that are requested for aircraft maintenance are diverted to other projects or programs?

Mr. WOLFE. In our opinion they are; yes, sir.

I think I mentioned we were able to identify only 31 percent of the total of the past year's appropriation requested for contract maintenance as having been contracted. Where the money has gone no one knows, and it is quite a mystery to industry.

I will dwell on that in a moment.

APPROPRIATIONS COMMITTEE INVESTIGATION

As a result of this deteriorating situation which came to light during your fiscal year 1958 hearings, your chairman ordered an extensive field investigation for this committee. Industry welcomed this action on your part and opened its doors and books in order that you could have all the facts upon which to base corrective action.

Industry requests that this report be introduced into this record in order that such findings can be studied by industry and the taxpayer. If your studies should show shortcomings on the part of industry, it is only fair that they be appraised of this in order that corrective measures may be taken. If the report bears out the contention of industry as presented by this testimony, we feel confident you will take corrective action.

BUDGET ANALYSIS

One of the difficulties experienced by all those interested in this subject has been the confusing "lumping" of overhaul, maintenance, modification and parts funds in military bookkeeping and budget presentation to Congress.

Industry, therefore, recommends:

That in future budget presentations and reporting, in order to clearly understand the true character of how basic funds are programed and used, your committee require a separation be clearly defined between Government workshops and industry; between remanufacture (modification) and repair-overhaul, and between competitive and noncompetitive contracting. Also a separation of the parts support funds required in the above programs. More clarity in available funds permits industry to do a better planning job. This concludes my direct statement and I shall be glad to answer questions. I would appreciate having two papers included in the record.

Mr. MAHON. They will be included at this point.

(The material referred to follows:)

THE AIRCRAFT SERVICE ASSOCIATION, PASADENA, CALIF.

THE PROFESSIONAL AIRCRAFT MAINTENANCE INDUSTRY

Aviation is divided into three basic segments: (1) manufacturing; (2) operations, and (3) maintenance. Maintenance, which bridges the gap between production and operations, is as complex and requires as high a professional skill capability as the other segments.

The Aircraft Service Association is an organization composed of 15 companies operating many plants in the field of military and commercial aircraft overhaul and modification. This hard core group was organized at the time of Korea when the military dependence upon private enterprise was at its hieght since World War II and provided the investment necessary to accomplish the majority of the competitive military contract work over a period of years. The association's principal purpose is a cooperative program with the military in achieving greater efficiency in the diffcult field of contract maintenance.

This group has a total of over $100 million invested in maintenance facilities. In this instance, however, no Government money is invested and the industry is one of the few aviation segments that has not had Government subsidy assistance. Profit levels have averaged only 2½ percent of sales, and over $20 million have been returned to the Government in the form of taxes during the past 5 years from both military and commercial operations.

Members of this association have been in business an average of 17 years and maintained over 6 million square feet of plant space and 161 million square feet

of ramp work areas. Many thousands of military, airline, and general aircraft have been maintained and overhauled for customers throughout the world by this industry.

THE TASA POLICY

The position of TASA on military aircraft maintenance is as follows:

1. This association believes in the O. & R. depot system, within proper balance, and that is in an important and necessary adjunct to our Nation's airpower.
2. This association believes that the function of the O. & R. depot system should (a) be confined strictly to the military aspects which include the tactical and training capabilities to adequately support our combat forces; (b) provide a standby facility available in case of national emergency; and (c) accomplish certain special work not compatible to industry shops.
3. The industry firmly believes that sufficient portion of the industrial type work shop activity should be contracted competitively to insure a healthy industry and the lowest cost to the Government; that the Government workshop should not compete with private enterprise and, to this end, that Congress should reaffirm this policy when allocating funds for this purpose.
4. The industry believes the incentive system of private enterprise has, in the past, and will continue to produce as well as maintain better weapons at less cost to the taxpayer and should be encouraged.
5. The industry believes that Congress should require that funds which they approve for contract purposes be spent accordingly and that a mandate accompany the appropriation similar to the MATS case.

QUALIFICATION STATEMENT OF THOMAS WOLFE

Thomas Wolfe, executive director of the Aircraft Service Association, is a graduate in science, Northwestern University, and has 36 years of aviation background as follows:

President, Thomas Wolfe & Associates, 1195 Rancheros Road, Pasadena, Calif. Consultant for approximately 15 aircraft companies nationally; Northwestern University transportation center, Evanston, Ill.; the Business and Defense Services Administration, Washington, D. C.

Formerly board chairman and president, Pacific Airmotive Corp., Burbank, Calif. Vice president in charge of the Pacific-Alaska division of Pan American World Airways, San Francisco. Vice president, Western Air Lines, Los Angeles. Board chairman and president, the Aircraft Service Association. Member of Manufacturers Council of the Aircraft Industries Association. Vice president, Air Traffic Conference, Air Transport Association of America. Pilot and author of "Air Transportation and Traffic Management" (800-page technical book).

Mr. MAHON. Mr. Boyle?

Mr. BOYLE. I have no questions.

Mr. FORD. I am interested in that one point, and I wonder if we could have a copy of your analysis showing how you came to that conclusion?

Mr. WOLFE. Yes.

Mr. FORD. That might be helpful to us in delving back into the situation.

Mr. WOLFE. I shall be glad to supply this survey data.

I might add that the Government is required to report contract awards and the Department of Commerce publishes a daily account of contracts in excess of $5,000.

We have searched these reports and we cannot find anywhere near the amount of money showing up in actual contracts let. That is one source.

We survey our own companies. They are competitors and bid on various offerings, and naturally they have all the requests for procurement in their areas. These were cataloged and we cannot identify but 31 percent of the funds being spent.

Your investigating committee, during the past summer, was contacted at the outset. I said "I wish you could find out from the military, in your investigation, where this money is and who are getting these contracts. We don't know."

Mr. MAHON. Mr. Wolfe, we are releasing on next Monday the volume of hearings entitled "Operation and Maintenance," and beginning on page 419 there is a report in connection with these problems which will be available to you.

Mr. WOLFE. Thank you very much. Would that be put out in separate report form?

Mr. MAHON. It is incorporated in the hearings.

Mr. WOLFE. I will secure one on Monday. Thank you very much.

The big point is that nobody, and even the investigating committee who spent the whole summer for the committee, has been able to isolate this data to my knowledge. I talked to them when they were near the end of their study.

They said they have asked the military for this information, and they answer time does not permit since it is such an extensive request. They stated they could not get it in time for their hearings.

It seems odd to most of us. First, they have to pay these contracts off with budget money and must know who has the contracts.

Second, the military is supposed to report these contracts through channels already established.

Third, it is difficult to understand how any command would not know at all times what contracts are in being and be able to get an abstract at any time.

From the outside looking in, we are puzzled by the fact that here we have the highest inventory in our history since World War II in aircraft hardware, we are spending the most money, and yet 36 percent of our companies have gone out of business in the last year, and the previous year they were down to 32 percent of capacity in operations.

There is ample money in the budget. There is no question about that. There is ample money to keep a healthy industry going.

This industry is often misunderstood. In this industry we have no Government funds in facilities—perhaps a special machine here and there, but they have invested their own money. They were brought into being primarily during World War II as aircraft companies doing commercial work who came to the assistance of the Government and the war effort.

Ever since then, up through the Korean war, they were used extensively.

Then slowly the depot system was enlarged more and more.

Mr. BOYLE. The jet age has made for a simplification of all aircraft, has it not?

Mr. WOLFE. Generally speaking. It is known the jet engine has fewer working parts. We are going through a learning curve, and some of the things that seemed simple are becoming complicated and other things that were complicated are simplified. We still do not have an answer.

Mr. BOYLE. That might answer in part some of the reason for the falloff of the business, don't you think?

Mr. WOLFE. The dollar amounts that you gentlemen approve and that the military requests are increasing. They are nearly double

what they were 8 years ago for this job. The inventory is increasing. The complexity is increasing, so I do not believe the change in character of the workload itself would cause a fall-off in business. I cannot see where it would be, because all indications are that the volume is there.

One thing we are sure of—every time you buy an airplane, maintenance is after the fact. You know that X number of years afterward you have to supply 25 percent more money to keep the dust from collecting on that airplane. Otherwise it is grounded. Therefore the more hardware, which we have now, the more maintenance will come along.

Mr. BOYLE. That is all.

Mr. FORD. That is all, Mr. Chairman.

Mr. MAHON. Mr. Laird?

Mr. LAIRD. No questions, Mr. Chairman.

Mr. WEAVER. I have no questions.

Mr. MAHON. We appreciate your appearance before the committee very much, and we appreciate your helpful suggestions.

Mr. WOLFE. Thank you very much, sir.

THE AMERICAN LEGION

WITNESSES

JAMES R. WILSON, JR., DIRECTOR, NATIONAL SECURITY COMMISSION, THE AMERICAN LEGION
EDWARD J. McDONALD, ASSISTANT DIRECTOR, NATIONAL SECURITY COMMISSION, THE AMERICAN LEGION
JOHN S. MEARS, LEGISLATIVE ASSISTANT, NATIONAL LEGISLATIVE COMMISSION, THE AMERICAN LEGION

Mr. MAHON. The next group from which we will hear is the American Legion.

Mr. MEARS. The principal witness is Mr. James R. Wilson, Jr., director of the national security division, and he is accompanied by Mr. Edward J. McDonald, assistant director.

Mr. MAHON. We are always pleased to hear spokesmen of the American Legion. We will be glad to have you proceed.

Mr. WILSON. It is a pleasure to be here, sir.

I am director of the security division of the American Legion. I am accompanied by Mr. Edward J. McDonald, assistant director of the national security division. Unfortunately our national commander, Preston J. Moore, because of previous engagements, could not be here today. He did want me to express to you and members of the committee his very, very sincere regrets. He feels very strongly on this subject of the defense appropriation, and I am sure he would like to have been here with us.

With the permission of the chairman and the committee I would like to read this statement that National Commander Moore would have presented had he been able to be here with you.

Mr. MAHON. All right.

STATEMENT OF PRESTON J. MOORE, NATIONAL COMMANDER, THE AMERICAN LEGION

Mr. WILSON. Mr. Chairman, gentlemen of this committee, I am indebted to you for permitting me to present the views of the American Legion on the 1960 defense budget, a subject which should be of paramount importance to every citizen of this Nation. We consider this budget inadequate for the protection of this Nation and we will state our reasons for our beliefs.

In my travels across this broad land of ours, I have made national security the subject of many addresses to Legion and non-Legion audiences. I present this point only to illustrate my sincere belief that Americans all must be made acutely aware of the importance of military strength in preserving our liberties and advancing our national aspirations throughout the world. They must be brought to a full realization that we are engaged in mortal conflict with an ideology that is irreconcilable with the principles for which our forefathers settled this land. From within and without the Communists are using every device to bring about the eventual downfall of our Nation. The American Legion has been about the task of exposing and combating communism since its inception 40 years ago.

Please do not draw from this that the national commander of the American Legion poses as an expert on military affairs. Far be it from that, for I draw heavily upon the same sources of information as this committee, except that your committee has the advantage of classified information. The conclusions I have drawn for presentation to you today come from the American Legion's national security commission and from my own appraisal of the adequacy of the 1960 defense appropriations to fulfill all the requirements that may be placed against it.

I realize full well that the direction of American strategy does not come within the purview of this committee, but there is a direct bearing between military appropriations and national strategy. Communist long range objectives leave no middle ground. Either they will succeed in their goal of world domination or the forces of freedom will emerge victorious. One thing is certain, there can be no middle ground—and most assuredly, "peaceful coexistence"—a clever phrase coined by the Communists cannot continue interminably. The keystone of our defense is our military strength in being. Military strength is an indispensible factor in the formulation of a revised national policy, one designed to liberate rather than to maintain the status quo. Without military strength of a magnitude to affect the military forces alined against us we cannot guarantee our own freedom nor offer hope to the millions enslaved by this detestable, atheistic dictatorship.

The forces we consider minimal must be sufficiently large and modern to present a near absolute deterrent to our enemies that they would not dare initiate attack upon us for fear of the retaliation against their homeland.

Mr. Chairman, I speak for nearly 3 million men and women who love this country dearly. At our national convention we try to obtain all available, factual information from Government, military, and civilian experts. It is upon the basis of these facts that our mandates are created. We do not profess to have nearly all the answers, but

we hope that our position will help this committee's deliberations. We believe that national policies must reflect the people's will and command the people's understanding.

I might digress at this point, Mr. Mahon; we are indebted to you for appearing at our January meetings at one of those sessions where we endeavor to gather factual information and where we obtain information that forms the basis of this report.

Mr. MAHON. Thank you.

Mr. WILSON. At the start of the cold war 13 years ago, the advantage was clearly ours. The Soviet Union lay partially devastated; we were unscarred and primed for pent-up peacetime demands. We had the bomb; the Soviet Union did not.

Today, the free world is losing the cold war. Illustrative of this point is the fact that the Kremlin has added to enslaved territories, without bloodying a single Soviet division, vast lands and hundreds of millions of captive peoples. Her prestige and influence in most neutral countries has increased while ours has waned.

No section of the world is free from the international conspiracy which seeks to agitate and create confusion—distorting the minds of uncommitted peoples and urging them to turn against the United States. Their method of agitation and distortion of truth is paying dividends, too.

The how and why of this incredible shift in the balance of power should be given careful study. But, the first, indeed the crucial move needed is an allout national effort to make up lost ground. Radical changes in our strategy, planning, and conduct of our military, diplomatic, economic, and psychological operations must be made—and immediately.

The American Legion's position today is consistent with our policies of the past. Only in strength can we find peace. We have said this before, and now we say it again.

The American Legion's mandates over the years calling for adequate military strength are made more meaningful by Russia's military buildup since 1946. If recent trends and present Soviet policies continue, Soviet military spending could increase by over 50 percent in the next 7 years without increasing the relative burden on their economy.

One of our most knowledgeable military authorities is reported to believe the Soviet Army has, on the average, five times as much modern equipment as the U.S. Army; Soviet conventional artillery is superior to that of the United States and the Russians have far more medium- and heavy-gun tanks than the United States and of about the same quality.

Russian missiles are reported to be from 3 to 5 times the power of ours and ours are 25 percent behind theirs in accuracy. These facts, of course, can be disputed, yet there appears to be validity in the statement when simple mathematics reveal a requirement of thrust of a higher order than we have developed to permit the Russians to hurl such sizable weights into orbit. The sophistication of their guidance equipment in the Mecthna moon rocket supports belief in their accuracy. Dr. Wernher von Braun has estimated that the Soviet moon rocket had a thrust of 700,000 pounds, roughly twice that of Atlas, and an excellent guidance system capable of hitting a small city at 5,000 miles distance.

Now, it is generally conceded the Department of Defense is placing principal reliance for its deterrent power in the Strategic Air Command until the solid-fuel MINUTEMAN gets into production, an estimated 5 years hence. But, grave concern is now being expressed about the deterrent capabilities of SAC. General Power, himself, has stated to this committee:

> I think you are just risking the whole country. This is how important I feel it is. The force which is now programed—which I am told by the Pentagon is programed—is not adequate because it is not coming fast enough. I want more and I want it faster. I have so asked for it.

Significantly, General Power pleaded for "more B–52's, more ATLASES, more B–58's."

Gentlemen, I would remind this committee that we are faced with evidence of growing Soviet superiority in both numbers and quality of intercontinental ballistic missiles; the United States, however, has voluntarily withdrawn from competition with the Soviet Union in the production of ICBM's. There appears to be valid reason for placing great store in the solid-fuel MINUTEMAN, which will be capable of firing without appreciable delay from hardened, well-concealed implacements. I, however, share the grave concern of Gen. Bernard Schriever that in light of the very great danger of attack we can, and should, maintain ATLAS ICBM production until MINUTEMAN actually comes into the military inventory.

In my opinion this is far too great a calculated risk of our Nation and its people when compared with the cost of maintaining a high level of ATLAS production even at $2 million apiece. Who is to say that succeeding in averting atomic annihilation during this period, that in 1962, for economy's sake we may elect to wait until 1965 for a still more sophisticated missile.

With respect to this deterrent force, which reposes mainly in the retaliatory power of the Strategic Air Command, we find SAC now maintains a 15-minute ground alert. This type alert will be useful when our Ballistic Missile Early Warning System is finished. Against a Russian missile attack now, we have little assurance of adequate warning.

A possible present-day remedy is to maintain a continuous airborne alert force of SAC bombers. Sufficient funds should be provided for such an airborne alert force. General Power has said he can do this and I believe he should be given the funds to place SAC on an airborne alert until our radar system is perfected and provides adequate warning time.

Funds are included in the budget for the purchase of 1,610 new aircraft; 703 for the Air Force, 668 for the Navy, and 239 for the Army. This is 150 planes less than last year.

We are opposed to the reductions in Air Force wings from 105 to 102 with the Tactical Air Command losing one wing and the Air Defense Command losing two.

It has been stated that these cuts were being made because of the increased effectiveness of missiles. Yet, the budget provides for $3,548 million in 1960 for missile production appropriations, compared with $4,154 million appropriated for the same purpose last year.

It seems significant to mention also that the proposed 1960 military budget of $40,945 million will be only $145 million above 1959, while

defense costs are reported to have been rising at about 3 percent annually and the spending increase is less than one-half of 1 percent.

The Navy has always been in the first line of our defense. We recognize it as a vital link in our total defense. I most certainly would be remiss not to discuss the appropriation granted to this important branch of the service.

The defense budget request admits nuclear power for the carrier requested in the budget would greatly enhance the combat capabilities of the carrier.

However, because the cost would be an estimated $120 million more, it was determined prudent to gain more experience with construction of the first nuclear-powered aircraft carrier before we commit ourselves to additional ships of this class.

While the American Legion certainly approves prudence in the expenditure of public funds, it would recommend that the defense planners take cognizance of the fact that it will be at least 1960 before the aircraft carrier is begun, an added 2 or more years to build it. By 1963 there appears a good chance that conventional powered aircraft carriers may be obsolete.

Certainly we question the wisdom of this type of "saving." On the basis of our naval affairs report adopted by the 40th national convention advocating "the development of the nuclear-powered aircraft program with maximum efficiency and speed" we urge this committee to make provisions for another nuclear-powered carrier.

The so-called reservations held by Admiral Arleigh Burke with respect to the Navy's appropriations include maintenance and modernization of ships and planes; procurement of ships, aircraft, missiles and associated electronic equipment, acceleration of anti-submarine warfare progress; procurement of fleet ballistic missile weapon systems; and research and development.

These are just a few aspects of the general cutback of the overall defense program, but to the American Legion they are indicative of the tenor of the defense program as outlined in the budget request of 1960. By adoption of Convention Resolution 372, the American Legion has placed itself on record opposing any weakening of our defense forces.

It seems inconsistent that we are cutting back our active and Reserve strenght while at the same time failing to make an all-out missile production effort.

The last Congress appropriated funds to maintain a 900,000-man Army, a 400,000-man Army Guard, a 300,000-man Army Reserve and a 200,000-man Marine Corps. We believe these strenghts should not have been reduced.

The American Legion has by National Convention Resolution 77 expressed its determination to oppose reductions and withholdings of funds. We believe one method is by establishing separate budgets for the reserve components including the Army and Air National Guard.

Another element in our general disappointment is that new budget policies tend to include appropriations together under too general headings.

For instance, while the Air National Guard budget was increased from $250 million in fiscal year 1959 to $252,800,000 in fiscal year 1960, the Air Guard's $18,900,000 procurement fund is not included in the Air National Guard budget but is included as a portion of the

regular Air Force allocation. Whether the Air Guard will get all the funds is up to the Air Force.

Mr. Chairman, even among sincere and dedicated men there may be differences of opinion as to what our Nation needs, and has a right to, in the matter of expenditure of public funds for our defense. While we find much to laud in economy, we feel that our defense budget for 1960 must be materially strenghtened.

It is significant that President Eisenhower, when describing the budget request for defense used the word, "essential". In my mind there is a connotation in this word which does not reassure.

Certainly, the military authorities I have quoted here today do nothing to support the belief that our defense posture does not need to be improved upon. We realize, in turn, that this improvement will cost money. We likewise recognize that the multidimensional thrust of communism is directed against our economic well being.

In that realization, and with the understanding that our economy must remain sound to combat Red fascism, it is my feeling that the American people would support additional taxation to provide the necessary defense posutre, provided that such tax moneys be specifically directed to strengthening our military posture.

In my travels throughout the Nation, people have shown a willingness to support tax increases if a strengthening of our armed might demands this. I pass this along to this distinguished committee, together with the recommendation of the American Legion's National Security Commission so that this "tax for security" idea can be considered.

With your permission, I should like to include pertinent quotes from the report of the American Legion's National Security Commission adopted following its January 1959 meetings here in Washington, D.C., which bear directly on the appropriation for defense.

Present world tensions demand ever-increasing diligence and personal sacrifices on the part of the individual American citizen if we are to maintain our present way of life.

We believe an objective evaluation of world conditions compels the United States and its dependable allies to continue to maintain a very high level of military preparedness. Our military forces should be sufficiently large and diverse to provide an effective deterrent to direct attack, or if circumstances demand, adequate to inflict decisive damage upon any adversary. In short, we insist upon an adequate defense not a minimum defense.

The National Security Commission believes a realistic appraisal of our military needs should be based on the nature of the threat which faces our Nation. To that end we believe our military forces including reserves should not be reduced below their present status in personnel or budget.

However, it is the conclusion of this commission that the United States can be destroyed by devaluing the American dollar by inflation just as surely as we can by not maintaining an adequate national security. To accomplish both, without deficit spending, this commission believes the American people would support additional taxation, provided this money was directed specifically to increasing our national defense posture.

Just how much it would cost to bring this Defense Department budget for fiscal year 1960 to the point where it will satisfy our national security needs is the decision of the Congress. However, the position of the American Legion is that the United States can well afford to err on the side of strength. But we cannot afford the luxury of spending 1 penny less than that which is required to give this Nation adequate defense.

I ask that the several resolutions supporting this statement be made a part of the official record.

(The following resolutions of 1958 National Convention of the American Legion, Chicago, Ill., September 1 to 4, 1958, were submitted for the record:)

RESOLUTION NO. 77 (TENNESSEE)—MILITARY AFFAIRS COMMITTEE

Whereas the budget as submitted by the President in January 1958 would have required a reduction in the Army National Guard of 400,000 officers and men, and in other units of the Ready Reserve of 300,000 officers and men on a paid drill status; and

Whereas we realize the necessity of conserving the economic strength of our Nation; and

Whereas the strength of the Ready Reserve including the National Guard should be authorized and fixed by the Congress of the United States by direct legislation; and

Whereas in order for this strength to be so maintained it is necessary that its budget be placed in a position where it cannot be withheld: Now, therefore, be it

Resolved by the American Legion in national convention assembled in Chicago, Ill., September 1 to 4, 1958, That a separate budget for the Ready Reserve, including the National Guard, be fixed by law and adopted by the Congress and that any curtailment of the Reserve Forces be opposed and their expansion advocated.

RESOLUTION NO. 78 (TENNESSEE)—MILITARY AFFAIRS COMMITTEE

Whereas there is no successful way to deal with Russia or its satellites diplomatically, politically, economically or militarily except from a posture of the greatest possible strength; and

Whereas no trust can be placed in any oral or written agreement made with of promised by these nations; and

Whereas the fairest and most democratic method of sharing the staggering financial cost and heavy sacrifice of personal service is upon a universal basis; and

Whereas we already have, through taxation, a method of universally sharing this staggering financial burden; and

Whereas the most economical and democratic method of providing the necessary posture of military strength is through a relatively small hard corps of professional Army, Navy, and Air Corps Establishment and a large Ready Reserve of trained civilians, units, and machines prepared for instant action: Now, therefore, be it

Resolved by the American Legion in national convention assembled, That the traditional position of the American Legion which calls for a small professional Military Establishment and a universal compulsory system of training and service in the Ready Reserve be, and the same is hereby reaffirmed.

RESOLUTION NO. 264 (CALIFORNIA)—MILITARY AFFAIRS COMMITTEE

Whereas, it has been reported in numerous sources, including the bulletin from our own National Americanism Commission, that propaganda is being disseminated for the purpose of slowing up or causing the United States to outlaw nuclear bomb testing; and

Whereas it has been expressed by those in authority that such testing is essential to maintain the competitive strength of our national defense; now, therefore be it

Resolved, by the American Legion, in national convention assembled in Chicago, That the United States take no action or enter into any agreement that would have the effect of weakening the Nation's position in the field of nuclear defense.

RESOLUTION NO. 357 (WASHINGTON STATE)—MILITARY AFFAIRS COMMITTEE

Now, therefore be it resolved by the 40th Annual National Convention of the American Legion in Chicago, Ill., September 1–4, 1958, That we advocate and urge a military preparedness of the United States and its dependable allies sufficient in every branch and department to deter any aggressor and to win if attacked;

That we prosecute the cold or psychological war, in all of its phases, from the highest level of government, with all the intelligence, vigor and determination of which our people are capable, fully realizing and acknowledging and adequately informing the American people that Soviet Russia and its controlled Communist international conspiracy have openly declared the cold war against the United States and the free world, and are ruthlessly waging it, at the same time deceitfully posing and propagandizing as the champion of world peace;

That we urge our responsible Government, in all of its branches, departments and agencies, to immediately make a soul-searching reexamination, reappraisal and reevaluation of our entire information and intelligence systems, services and agencies; and of our overall and detailed global strategy for waging the cold or psychological war, all with the purpose and determination of winning some of the cold war engagements or conferences, and eventually winning a decisive victory for the free world;

That we urge the President to request the Congress to amend that portion of the National Security Act of 1947, as amended, relating to the National Security Council, to create a special full-time staff to study and formulate plans to combat the cold or psychological war now being waged throughout the free world by the Communists.

RESOLUTION NO. 372—MILITARY AFFAIRS COMMITTEE

Whereas we of the American Legion strongly question the wisdom of policy decisions in Washington that have resulted in the reduction of America's conventional fighting forces and also in a lag in American military preparedness; and

Whereas we specifically question the decisions that have reduced our Army's division strength, that have cut back Marine Corps manpower, that have canceled procurement of needed air transport (the C–132), that have delayed missile development, that have cut back on National Guard and Reserve manpower and training programs, and that have delayed or curtailed much needed atomic submarine construction and antisubmarine preparations by the Navy; and

Whereas we of the American Legion have always believed in a strong defense program: Now, therefore, be it

Resolved, That the American Legion National Convention assembled in Chicago, strongly urges Congress to halt any cutback in the defense program and in lieu thereof to use every available means to finance the strongest defense and military preparedness program possible, and that we, believing in the principles that America should take second place to no nation, and realizing that a vicious enemy of our way of life is threatening constantly, urge Congress to again give the United States the greatest military strength of any nation in the world.

RESOLUTION NO. 614—AERONAUTICS CONVENTION COMMITTEE

Whereas the Soviet Union has a formidable intercontinental bombing force, a growing missile capability, and a stockpile of nuclear weapons; and

Whereas all these pose a direct threat to the freedom and the very existence of the free world, including the United States; and

Whereas the retaliatory capacity of the United States, with a primary weapons system in the Strategic Air Command, has stayed the attack which the enemy poses against us; and

Whereas the advance in Soviet technology and weapons systems has diminished the time of warning of an attack to a matter of minutes, with the result that it is necessary for the Strategic Air Command to maintain runway alert forces in order to preserve our retaliatory capacity; and

Whereas the maintenance of runway alerts requires air-and-ground-crew members to stand by cocked aircraft without even removing their clothes for long periods of time; and

Whereas much of the alert force is maintained at overseas bases, with disruption of family life, in addition to physical discomfort and nervous strain; and

Whereas combat crews of the Strategic Air Command are, and must be men with the finest type of motivation and the highest order of patriotism; and

Whereas recognition of the value of alert duty will give added incentive to these men on whom our continued existence depends: Therefore be it

Resolved, That the American Legion petition the Congress to provide "alert pay" in an amount, such as $5 to $10 per 24 hours of alert duty, as an expression

of the Nation's confidence in and appreciation of these men who are the protectors of the existence of the free world, and we support this principle for application to any comparable situation either now or in the future.

RESOLUTION NO. 618—MILITARY AFFAIRS COMMITTEE

Whereas the Strategic Air Command is uniquely suited to meet the challenge of limited war with its highly trained manpower and its graduated firepower; and

Whereas speed of reaction is required to cope with the threat of limited war; and

Whereas sufficient strategic airlift is not now available to transport Army combat elements from the United States to a trouble spot rapidly or to support such a force by air until such time as surface transportation can take over the supply task; and

Whereas this lack of adequate airlift inhibits this Nation's ability to respond quickly and forcefully to a threatened or actual limited war situation: Now, therefore be it

Resolved, by the American Legion in national convention assembled at Chicago, That the air transport capability of the Armed Forces be increased to the degree necessary to allow rapid transport of two divisions of the Strategic Army Corps to a troubled area.

RESOLUTION NO. 619—MILITARY AFFAIRS COMMITTEE

Whereas it has become increasingly probable that future Communist efforts toward expansion will take the form of limited and local aggression rather than massive action which would provoke all-out nuclear warfare; and

Whereas, the U.S. Army, by virtue of its training, experience and organization, is uniquely qualified to respond to limited aggression; and

Whereas the Army has worldwide commitments which absorb a large proportion of its resources and, in addition, has responsibilities at home in the fields of air defense and training of both Regular and Reserve forces; and

Whereas, these commitments, coupled with current limitations on the size of the Army, have reduced to a dangerously low level the number of Army units constituting the strategic Army force available to respond to acts of limited aggression; and

Whereas any further reduction in the strength of the Army will constitute a weakening of the security of the Nation; now therefore be it

Resolved, by the American Legion in National Convention assembled at Chicago, That the U.S. Army be maintained at not lower than its present strength so as to permit it to meet fully its present commitments and missions, including the requirement for a strategic Army striking force.

RESOLUTION NO. 641—NAVAL AFFAIRS COMMITTEE

Whereas the policy of the Communist bloc has been and now is "to divide and conquer"; and

Whereas the free world is fundamentally a confederation or alliance of nationst whose security depends upon continued control of the seas by the free world; and

Whereas the Soviet Navy is now the second largest in the world whose personnel outnumbers the U.S. Navy almost two to one and whose submarine fleet outnumbers ours by over 5 to 1, thus constituting a serious menace to the free world; and

Whereas the U.S. Navy is the only modern and effective naval force in the world today able to protect and keep open our sea lanes against the steadily growing threat of Russia, a responsibility which we must not evade; and

Whereas the concept of modern naval warfare has almost completely changed from traditional operations of the past and now incorporates the use of nuclear power and nuclear weapons requiring continuing scientific research and development to the end that our Navy will maintain supremacy over that of any other nation: Now, therefore, be it

Resolved, That the American Legion in National Convention assembled in Chicago, recommends the maintenance of the following:

1. A balanced Navy and Marine Corps is absolutely essential. They must be ready at all times to fight small wars as well as large with utmost mobility. To

apply the right kind and right amount of pressure, where and when required, must always remain a capability of the U.S. Navy.

2. The Navy must do its utmost to secure and train personnel to man a strong naval and marine air arm and all of their balanced forces. Particularly it must man and operate atomic propulsion, missiles, supersonic airplanes and nuclear weapons, emphasize research and development and do its utmost in the search for and training of engineers and scientists for years to come.

3. The Navy continue development of—

(*a*) Antisubmarine forces to be able to strike down hostile submarines at their source and to search them out and destroy them at sea. To combat successfully enemy submarines they must be sought and attacked from the air, from the surface and from beneath the seas.

(*b*) Atomic propulsion—undersea and on the sea—to lessen or eliminate the necessity for conventional refueling.

(*c*) Weapons of every kind from the rifle in the hands of a marine, through all types of missiles to nuclear weapons.

(*d*) Ship design and electronic development increasing mobility, speed, and the ability of an entire task force to deliver a devastating blow either by conventional or nuclear weapons as the circumstances require.

(*e*) Sea-based missiles, capable of reliable performance, compact stowage, rapid reloading, and engineered to the specific requirements of naval use from submarines, surface ships and naval aircraft.

(*f*) Submarine ballistic sea power to the end that the atomic-powered submarine may be able to utilize the POLARIS type of nuclear missile to its utmost emciency.

(*g*) The nuclear-powered aircraft carrier program with maximum efficiency and speed.

4. The Navy must maintain control of the seas. Only with sea power can the United States import strategic raw materials vital to industry and vital to any war efforts. The capacity to support foreign policy, to deter aggression and to insure that our friends and allies remain free nations, depends in large part upon seapower. United States naval power is indispensable in projecting and applying military power—land, sea, and air—anywhere in the world. The mobility of naval ship bases, their flexibility of operation and their known and proven effectiveness against specific types of enemy aggression and military attacks cannot be provided by any other type of installation.

5. The Marine Corps should be kept to its full authorized strength and equipped with the most modern weapons to enable it to carry out its historic mission of amphibious warfare.

6. Cooperation by all posts of the American Legion in recruiting for the U.S. Navy and U.S. Marines both regular and reserve is our continued policy. Added now is the search for specially trained scientific people for present and future operations, research and development.

Mr. WILSON. Mr. McDonald has brought along for the committee's perusal the materials which comprise the major part of the Security Commission's program.

THREAT FROM WITHIN

Mr. MAHON. Thank you, Mr. Wilson.

You have made a very interesting and provocative statement with regard to an issue in which all Americans must be concerned.

There is a feeling among many people of the country that the threat to our country is from within as well as from without.

At Lubbock, Tex., which is my hometown, a program has been launched called Operation Alert. The object of this program is to alert the people to the tremendous threat of the Soviet Union today. However, it has a larger connotation. The object of the program is also to alert the people to the dangers of moral deterioration within the country.

There is a feeling among many people that we are getting a bit soft; we are too often irresolute. It is true that we have many advantages and many sophisticated machines. We have gone a long way in per-

fecting these so-called essentials and luxuries, but luxuries very often make a people of a country less strong and less firm.

Our people, when they were pioneers and had to live strenuous and rugged lives, developed a type of courage and resolution and a spirit of sacrifice which many say we have more or less lost now.

Does the American Legion in its program give consideration to this matter which I have been discussing?

Mr. WILSON. Yes; Mr. Chairman. However, it is in another phase of our program—Americanism. You are familiar with our program through which we try to inculcate in the youth of the Nation, through our Boys State program, Government at the State level. Each summer we bring the Governors and Lieutenant Governors of each Boys State here to Washington to teach them the functions of the Federal Government.

In addition, we promote love of our Nation through our high school oratorical contests, the subject of which must be the Constitution of the United States and the extemporaneous portion must be devoted to the Bill of Rights.

We do this, also through our own national security program—to a certain extent. We encourage the members of the national security commission, of whom there are some 150 on our executive session and 1,000 on our general committee, to participate in conferences such as the one I attended recently in Chicago, the fifth military industrial conference, which has as its topic the economic threat which is imposed against our country by world communism.

I could go on and mention many, many other programs, but the American Legion itself has found this:

We do not believe that the basic spirit, the moral well-being of America is any less virile today than it was in days past. But I do believe that over the years the clear understanding of the principles which this Nation has always represented have been beclouded.

I could be wrong on this, sir, but I think this, too, could be attributed in part to Communist psychological warfare.

Mr. MAHON. That is very interesting, Mr. Wilson. That is an interesting observation.

I want to say that many of us on the committee have been most concerned about the adequacy of our plans and programs for the future, and we have spent the better part of the last 3 months in undertaking to evaluate these matters.

The programs covered in a budget as big as more than $41 billion are of such magnitude it is almost impossible to evaluate every part of them. We are doing our best to evaluate the more significant and essential portions of it.

Mr. Andrews?

Mr. ANDREWS. No questions.

NEED FOR INCREASED DEFENSE EXPENDITURES

Mr. FLOOD. Let me say this, and I wish you would take this back to your commander. I do not have the honor of belonging to your famous organization so I can say what I want one way or the other.

This statement is a breath of fresh spring air in this room to me, this whole business from beginning to end.

I may disagree with perhaps one or more line items and certain kinds of hardware but forget about that. With your kind of thinking you could even sell me what I might not agree to.

You tell your commander this, and I hope he thinks along economic lines sufficiently to establish the need for this military line; but I don't know what he thinks.

I want to see this done, and I am not concerned that some say it cannot be done. And I do not believe that this will bankrupt the Nation.

We have heard here in that chair the greatest leaders in this Nation from the Department of Defense and elsewhere tell us that between now and 1964 are the bad and desperate years, and if we get through 1964 in one piece it is even money we will make it. These are the bad, black years—up to 1964.

Balancing a budget seems to be the problem. This is what I hope your American Legion would agree to, or think about, or say something about.

You are a solid, recognizably conservative organization. Sometimes you button on to things that are none of your business, but that is your policy. But this is really your business. On this I recognize you. There are a lot of things where I do not.

However, this is your backyard.

Your commander and your organization have forgotten more about this than I will ever know. This time you are right and this is your major premise.

It is nice to be right on your major premise.

I want you to know that I think this Nation can go ahead with a proper economy to do this, to go ahead with this budget and those ahead, bigger and more of them for defense.

I want to see if necessary the defense budget be able to take $10 billion more in 1964 than it takes this year, $10 billion, and it can—it must. However, it cannot be done under a philosophy of government or an economic premise which is so concerned about inflation and balancing of the budget that it restricts by monetary manipulation and by lack of proposed legislation and other programs any development of the economy and production potential and employment potential to have this done.

Up until 1953, for 30 years before 1953, the gross national product of this Nation showed an increase every year on the average of 3 percent.

Take out the war years where it went sky high to 9 percent; take out the depression years where it dropped 9 percent; the average showed 3 percent national increase of the gross national product.

Do you know what the gross national product has been since 1953? One and five-tenths percent. There are many reasons why, which I cannot tell you now economically and as the philosophy of government. That is the fact.

This gross national product of ours, to do what your great organization wants and what I want, and it must be done, must show a gross national product percentage increase every year amounting to 5 percent, 5 percent a year.

In 1964 that will give us even at the present philosophy of government a $500 million gross national product.

To give you a 5-percent increase under a revitalized Government it will give you $650 million a year gross national product, and that will give you what you want every year, every year, every year. It will reduce the national debt ratio from 63.7 percent as of today to 47.3 percent as of 1964, QED, without law, without manipulation, and it will follow.

Mr. MINSHALL. Will you yield?

Mr. FLOOD. In a minute.

Mr. FORD. This is a day for outside witnesses.

Mr. FLOOD. This is outside talk.

Mr. FORD. That is what we meant.

Mr. FLOOD. Take the message back that I said that, because that is the only way this can be done.

If you propose tax schedules to do it, I will vote for them, and so will everybody else who means this.

But an economy of fear and an administration of government which porposes by its philosophy reports of commissions as to what has been done, has been the state of the economy, "this is what we have done," says nothing as to what we should do to accomplish what you say with vision of the future.

Those things are a condition precedent to what you want, and if you do not get and if you do not support and if this Nation does not get and if this Congress does not produce what I have said, then you are not going to get this defense program because then we cannot afford it. You cannot have it both ways.

Take that back to your boss.

I am for what he wants.

Mr. WILSON. That is precisely the way we feel about it.

Mr. FLOOD. I don't know whether or not you do but you had better. That is all.

Mr. BOYLE. Will you let the record show at this particular time there is a projected $14 billion deficit in fiscal year 1959?

Mr. FLOOD. By all means. That is something you never had during 5 years of another administration, three out of the four budgets where we had a balance. In 3 out of the last 5 years and in the next one you will not have that. There is a deficit of $14 billion this year. It is not because of wage increases, not because of a spending Democratic Congress; not at all there is much more very much more which caused this huge deficit.

Mr. BOYLE. I want to make the observation that personally and privately I feel that the cause of peace is best preserved from the posture of preparedness.

It is my further feeling we are going to have a deficit of $3 to $5 billion in fiscal 1960.

But even in spite of that projection, we cannot afford the luxury of cutting the military budget except in places where it is demonstrated that the economies can be effected without hurting our chances.

There isn't too much testimony to the effect that we have an abundance of people familiar with all of the facets of fighting a cold war, and it would seem that your organization, with all of its knowledge in military matters, might lead the parade toward teaching the rest of the United States how you can best fight a cold war. This is not only a cold war but in addition it is a violent peace.

I share Congressman Flood's feelings since this peacetime military budget is almost 70 percent, at least 65 percent, of the total Federal budget for next year.

We know that the cost of armaments, cost of military hardware, and all incidents thereto will subsequently become higher each and every year.

I, too, would like to see an economy where production is stimulated and where production and consumption are harnessed in a complementary fashion to keep us strong and still not do violent injustice to the economy of our country, because the testimony here from almost everybody of any prominence and any stature indicates that they see no change in the cold war for from 10, 20, and even 50 years.

Mr. ANDREWS. Mr. Ford?

VIEW THAT BUDGET IS ADEQUATE

Mr. FORD. I speak as one of Commander Moore's constituents, having been a member of the American Legion for 13 or 14 years.

Whoever wrote this statement for the record did a good job from the point of view which has been expressed here.

Certain quotes have been taken from certain witnesses before this committee as well as statements made by other military officials elsewhere.

I think it is fair to say, however, that we have had witnesses before this committee, and I can get the statements from the record, among the top responsible military officials in all services, indicating they do not agree with many of the statements quoted in your prepared text.

For example, General Twining, Chairman of the Joint Chiefs of Staff, has indicated his approval of this budget and this overall program for fiscal 1960.

Admiral Burke, Chief of Naval Operations, has likewise indicated his general approval, in fact all of the Joint Chiefs subscribe with some minor reservations.

Admiral Burke does indicate that he feels there is a limited maldistribution of the overall amount of funds, but he is categorically on record saying that $41 billion in fiscal 1960 is fully adequate for the defense of the United States.

He says, incidentally, that in his opinion we are overbuying insurance on the so-called long-range strategic missile and manned aircraft program.

In addition to that, General White, Chief of Staff for the Air Force, disagrees with your viewpoint here, as his testimony indicated before the committee. He believes that the present program is sound. He subscribes to the various fundings that are involved.

General Pate, the head of the Marine Corps, likewise disagrees with your presentation here in that he believes this is a sound budget.

He may disagree as to some limited particulars, but he does not subscribe to the broad condemnation which the American Legion has taken here.

General Taylor likewise subscribes to the total of funds in the budget. He disagrees to some extent as to the distribution of $41 billion in fiscal 1960.

We have heard a multitude of military witnesses from all services.

This country could not satisfy the dollar desires of every military witness from all branches of the service. The Congress could not enact taxes sufficient to pay the bill.

I think the time comes when the top responsible military and civilian leaders must be supported in their decisions. The Congress has its own obligation but the House and Senate must rely on the combined judgment of the President and his ranking military advisers rather than partisans for a specific service or a program within a service.

Mr. WILSON. If I may comment on that, Mr. Ford. Everything we have in this statement, everything, barring nothing, is taken in part from the testimony of what we consider to be top military leadership or top scientific leadership.

I realize that initially there was a certain sense of temerity in the top military leadership to speak out in what I believe was their honest opinion on this subject.

I have right before me here the statement of Admiral Burke.

I also have the statement of General White.

Every one of the service leaders here at some time since this budget first came under decision had objection to make to it.

DESIRE OF MILITARY LEADERS FOR MORE FUNDS

Mr. FORD. As to the distribution and not as to the total.

Mr. LAIRD. Not as to the total amount.

Mr. WILSON. Not the total amount. You see, each one has his particular responsibility.

General Pate's initial responsibility is to the Marine Corps. He felt that a figure of 200,000 men in the Marine Corps was minimal.

Mr. WEAVER. There was not one witness testifying, confirming what Mr. Ford has said who has not stated he would take all he could get and more for his service.

Mr. WILSON. We are in complete agreement on this. If they could get $10 billion more apiece I think they would take it.

I have heard General Power and talked with him personally, and I know you have, too. Here to me is a sincere and dedicated man who is willing to lay his stars on the line, and I think he is doing precisely that.

Mr. FORD. I do not doubt their integrity, do not doubt their sincerity, but they are not in the position of having to make the ultimate decisions involving the overall security of the United States.

Mr. WILSON. Right.

Mr. FORD. We must have some reliance on the people who are in a higher echelon.

Mr. WILSON. As regards this statement, the commander himself took personal direction of what is incorporated in this statement.

What the American Legion has placed before this committee today is done in utter sincerity. This is the way we feel about it. I think your morning paper gave adequate indication——

Mr. MINSHALL. You mean the Washington Post?

Mr. WILSON. All right, the Washington Post, yes.

Mr. WILSON. I think they reported this factually, that in effect the Soviet Union is becoming even bolder than in the past in what we will term missile blackmail. She is laying down the line to these countries.

If you accept the missiles in your country you will accept the consequences.

This I believe she does with a full knowledge that she has a tremendous military power.

I am trying to equate in my own mind what happens when our power continues at the same level and the Soviet Union's military power continues to rise.

Mr. FORD. Are you familiar with the testimony in the record from Admiral Burke, from General Taylor, from General Pate, to the effect that we have sufficient strategic deterrent retaliatory strength, with all safety factors cranked in, to destroy all significant military targets in the Soviet Union? That is on the record.

Mr. WILSON. I am familiar with that statement by not only the admiral, but I think General White himself has made this statement.

Mr. FORD. There is no doubt in their mind, according to the testimony they have given us in this committee. They are the military leaders who have to make the final decisions. They are not primarily interested in just a single segment of the whole.

Mr. FORD. That is all, Mr. Chairman.

Mr. LAIRD. Mr. Chairman, I am another constituent of the national commander of the American Legion. I am quite interested in this statement. It seems to me that it is a collection of the reservations which have been taken by the individual services and different field commanders against their cut in the defense pie.

I note with interest that the American Legion is in favor of raising taxes to pay the bill if additional funds are needed. I commend the American Legion for facing up to this problem.

ENDORSEMENT OF AIRCRAFT CARRIERS

I would like to ask just a couple of questions. Let us take one example. I notice in your presentation—I do not mean to be addressing you, for it is the national commander's presentation—you endorse an aircraft carrier. This aircraft carrier, it is true, is in the budget, with conventional-type propulsion rather than nuclear power, but it is carried in the budget. It is an item of some $270 million by the time you get through with it and get it to sea.

This carrier does not have the approval of the Joint Chiefs of Staff. It is approved by the Navy, and it has been included in the budget by the President.

Do you think the carrier is of greater significance than, say, the POLARIS submarine program? We have had recommendations that POLARIS program should be increased rather than the carrier, but I notice that the American Legion has come out for the carrier.

Mr. WILSON. I might point out in answer to that question, sir, that everything cited in this particular statement was in that portion of the national security report which supported this particular recommendation. You will find appended to the back the overall report of the Naval Affairs Committee, which includes an endorsement of undersea power.

I might also add, just for the committee's edification, that the national commander is bound to stay within the confines of these mandates which are adopted by his national convention. He has no power whatsoever to go beyond the scope of these resolutions.

Mr. LAIRD. That is why the carrier is singled out?

Mr. WILSON. That is it. As I say, sir, you will note in the back, the Naval Affairs report. It is an all-encompassing support for naval power, including submarines.

All we did was point out that particular thing to support our view that this carrier, which is approved, might better have been equipped with nuclear propulsion rather than conventional propulsion.

Mr. LAIRD. Are you aware of the fact that Admiral Burke said if we gave him the money for nuclear propulsion and increased the amount of funds in this bill in an amount which would cover nuclear propulsion, he would recommend that the money not be spent to put nuclear propulsion in the carrier?

Mr. WILSON. I was not aware of that.

Mr. LAIRD. His testimony will indicate, I am sure, if you will look over our published record, that if the funds were made available, he thought there were other areas in the Navy add-on budget to which he thought they could be much better applied.

Mr. WILSON. If I may, my personal view on this, sir, would be that money could not be put in any better place than the POLARIS missile, the atomic submarine. I think that one of the places it is needed. To me, POLARIS constitutes a tremendous deterrent capability.

ICBM PROGRAM

Mr. LAIRD. You consider the POLARIS system the same as the ATLAS, do you not?

Mr. WILSON. I do, indeed.

Mr. LAIRD. Personally, I feel it is a much better deterrent power than the present ATLAS missile. I notice the American Legion has specifically named the ATLAS, whereas another deterrent power which is in the same area is the POLARIS weapon, which is an ICBM and is omitted in your presentation.

Mr. WILSON. I tell you why we did that, sir.

Mr. LAIRD. It is an ICBM, because it can cover much the same target areas.

Mr. WILSON. As we understood it, Mr. McElroy was willing to concede a 2 to 1 or 3 to 1 numerical superiority to the Soviet Union during the interim period until the MINUTEMAN came into the inventory. That is why we used this as comparison. The production of ATLAS's would be carried on a very limited basis until MINUTEMAN came into the active inventory.

Mr. LAIRD. Just a rough calculation on the items you set forth here would add about $3 billion to this budget.

Mr. WEAVER. More than that with the air alert.

PROPOSED TAX INCREASE

Mr. LAIRD. I am not including the air alert. I am including the big hardware items you have in here and the increase in personnel strength. That would add about $3 billion to this year's budget. Are you going to make a presentation before the Ways and Means Committee as far as the tax program for this particular increase you are requesting?

Mr. WILSON. Right at the moment we have no plans to do that, sir, but if it is the feeling of the committee that we should, we certainly are not hesitant about that.

Mr. LAIRD. We are more or less bound to stay within some reasonable bounds as far as spending is concerned. I note that you go along with taxes to pay for this. At the same time, I think we would be under severe criticism if we went too far beyond the bounds of the funds that are going to be available in 1960 to pay the bill.

That is all I have, Mr. Chairman.

Mr. MAHON. Further questions?

PREPARATION OF STATEMENT

Mr. WEAVER. Could you tell me who actually prepared this statement?

Mr. WILSON. The statement was prepared in our office—the National Security Division—which is the administrative arm of the National Security Commission.

Mr. WEAVER. In your statement you mention that your visits with military and civilian leaders are the basis for any position that you take publicly. Is that correct?

Mr. WILSON. In this particular, yes; mandates, also.

Mr. WEAVER. Has this statement been referred in any way to the Legion posts throughout the country for them to state their feelings one way or another?

Mr. WILSON. No, it has not.

Mr. WEAVER. Are you expecting to do that?

Mr. WILSON. No, sir. They give us a mandate, which is the consensus of the delegates to a national convention. You see, each department and post is represented at the national convention by some 3,000 delegates and 3,000 alternates. They are the ones who, through convention committees, hammer out this policy upon which this statement itself is predicated.

Mr. WEAVER. I believe that is all I have, Mr. Chairman.

DISAPPROVAL OF STATEMENT

Mr. MINSHALL. What use do you plan to make of this statement? After it has been placed in the record, do you plan to send copies of it to your posts in your various districts?

Mr. WILSON. Yes, sir. We use all of our media of communication.

Mr. MINSHALL. If that is the case, I want my name put right up at the top of this report, as a Legionnaire and as a veteran of World War II, saying I highly disapprove of your statement. I do not question your personal integrity and the spirit in which you have given the statement but it is unfortunate that a group which enjoys such an enviable and outstanding reputation as yours would make such a statement without having access to all of the information upon which such a statement must be based. You have not said one thing except ask for more money and to find fault with the President's defense budget. When it comes to things regarding the military, I myself will take our Commander-in-Chief's word for this when it comes to such things, ahead of the American Legion, or any other group.

INCREASED COSTS RECOMMENDATIONS WOULD ADD TO BUDGET

One specific question. I would like to know how much in billions your recommendations would add to this year's budget.

Mr. WILSON. I have no estimate myself. I understand Congressman Weaver estimated $3 to $5 billion.

Mr. MINSHALL. What is your estimate? You must have come up with something. You did not just take a number out of a hat, without figuring it out. You say you are going to ask for more taxes. How much more in taxes will you ask for?

Mr. WILSON. The national commander figures about the same figure, about $4 billion.

Mr. MINSHALL. About $4 billion.

Mr. WILSON. Yes, sir. I think the Rockefeller studies figured somewhere around $3 billion a year would be added to the budget.

Mr. FORD. You want to be real careful on that, because Mr. Rockefeller was before this committee last year right after the report was published. He really did not say that the next 3 to 5 years, as I recall, $3 billion would be added each year. In fact, he categorically denied that. His testimony indicates that they felt that certain other savings within the total could be accomplished, but that in certain specific areas $3 billion should be added. That is a part of his own testimony before the committee a year ago in January, as I recall.

Mr. LAIRD. I think also it should be pointed out that that $3 billion figure which the Rockefeller report uses did not give any consideration to the $40 billion base. They said there were things in the base that the $3 billion would come from, but they did not review the base before they started on their takeoff point. This is important, I think, in this consideration, because you have to go back and look over and consider the base.

Mr. MINSHALL. It is my own opinion that the recommendations of this statement for additional funds would come to substantially more than $4 billion. Just the SAC air alert in itself would add a fantastic amount to our budget. An increase in our missile production in itself would add substantially more. You are up to $4 billion or more with just those two items.

That is all I have, Mr. Chairman.

Mr. MAHON. Further questions?

Thank you very much, gentlemen. Your presentation has been most interesting and stimulating, and we will give it our very closest scrutiny.

Mr. WILSON. Thank you, sir.

Mr. MCDONALD. Thank you, sir.

Mr. MAHON. Tell the commander we are sorry he could not be with us, but we are pleased to have his views.

Consulting Engineers Fees

WITNESSES

ARTHUR M. GOMPF, NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS
MILTON F. LUNCH, LEGISLATIVE COUNSEL, NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Mr. Mahon. The next group to appear is the National Society of Professional Engineers. Mr. Gompf, would you identify yourself for the record.

Mr. Gompf. Gentlemen of the subcommittee, my name is Arthur M. Gompf. I am secretary of the functional section for consulting engineers in private practice of the National Society of Professional Engineers. The national society is a nonprofit membership organization composed of over 48,000 professional engineers in virtually all branches of engineering practice and type of employment. Each of the society's members is registered under an engineering registration law, which is in effect in all States, Territories and the District of Columbia. Since its inception the society has been concerned with the impact of national legislation upon the engineering profession, and in that connection, has testified from time to time before congressional committees on various matters of interest.

Aside from my relationship with the national society, I am a partner in the consulting engineering firm of Egli & Gompf, with offices in Baltimore, Md.

Approximately 12 to 15 percent of the society's 48,000 members are consulting engineers engaged in the private practice of their profession. Many of them have in the past, or are in a position to, perform professional consulting engineering services for various agencies of the Federal and/or State and local governments. It is with particular reference to the interests of these consulting engineers that I appear on their behalf before this subcommittee today.

My discussion will pertain to the question of engineering fees in proposed Federal legislation, and the effect of such established fees upon the Government agencies involved, as well as upon the engineering profession.

The invitation extended to the national society to appear before this subcommittee in connection with the Defense Department appropriations bill for fiscal year ending in June 1960, relates, we believe, to our recent letter to the members of both the House and Senate Appropriations Committees relative to the question of adequate per diem fees for experts and consultants, whose professional services are utilized from time to time on an intermittent basis by various agencies of the Federal Government. The procurement of the services of experts and consultants on a temporary basis by departments of the Federal Government is authorized in section 15 of the act of August 2, 1946, found at 5 United States Code 55a. The maximum per diem allowance for such services is generally controlled either in the organic act creating the Federal agency or department, or in annual appropriations measures. Consequently, the rate is not uniform, and presently varies anywhere from $50 to $100 per day.

The official society policy with respect to the procurement of professional consulting engineering services by Federal agencies and departments is as follows:

NSPE heartily endorses the principle of utilization of engineering consultants by the Federal Government on a per diem basis, or such other basis as may be mutually agreed upon. Legislation establishing maximum per diem fees should reflect an allowable per diem rate of at least $100.

In view of this official position, the national society has been seriously concerned with the tendency in annual appropriations measures of setting an allowable per diem rate at a figure less than the adequate and reasonable $100. It is particularly germane to the deliberations of this subcommittee to note that the Department of Defense Appropriations Act for fiscal year ending June 1959 (Public Law 85–724) permits compensation to be paid experts and consultants "at rates for individuals not in excess of $50 per day."

This $50 per diem limitation, in our considered judgment, is neither adequate, reasonable, nor fair; nor does it properly insure that the best interests of the Government will be protected. We feel qualified to make this statement prefaced by the basic premise that the Federal Government deserves and is entitled to the very best engineering talent obtainable, from whatever source. However, I know from my own experience, and from having discussed this matter with numerous prominent consulting engineers throughout the country, that in most instances it is not economically feasible to perform professional engineering services for less than $100 per day. The net result of a Federal limitation less than this amount could very well be that the most qualified engineers would be unable to undertake engineering projects for the Government. This is a situation in which the Federal agencies can ill afford to be placed.

It is important for the subcommittee to note that the $100 per diem rate we are talking about is, after all, only a maximum figure, and that Federal agencies may actually reimburse experts or consultants at less than this amount depending upon both the stature of the consultant and the type of service to be performed. However, we must realize that the most valuable commodity which the consultant "sells" is his time, coupled, of course, with his ability. Professional competence to the degree required by Federal agencies can only be developed after years of prolonged intellectual study and experience. Is it not reasonable and fair that experts and consultants be compensated at a rate commensurate with their vital time and ability? If this be so, and I am certain you will agree with me that it is, then it naturally follows that the expert or consultant should be compensated at a rate which will equal the remuneration he could expect from expending his professioal efforts in other fields of endeavor.

As a further practical matter, most experts or consultants called upon from time to time by Federal agencies actually operate their own offices or are members of firms or partnerships. In other words, only few do nothing more than part-time consulting. Under these circumstances, when a consulting engineer, for example, performs intermittent services for the Federal Government, the expenses and otherhead incidental to running his office continue. He must allow for rent, office supplies, and general administration of his practice. Also, he must often, as an integral part of his professional service, prepare reports, plans, or studies which require him to assume expenses for

clerical and stenographic assistance. Furthermore, he might often require assistance on a Federal project from his associates, draftsmen, or other members of his office. These miscellaneous costs constitute an expense to him; if he is to be able to perform professional services for Federal agencies, his per diem allowance must be sufficient to cover these incidentals, and still leave him with compensation in an amount which he could otherwise command from other clients.

The question of allowances for overhead expenses has been considered in the "Summary of Manuals of Practice and Fees Schedules for Consulting and Design Engineers," recently prepared by a task force of the society's functional section for consulting engineers in private practice. This "summary" is basically a compilation and comparison of information available in recommended fee schedules prepared by many state societies of professional engineers. With regard to the percentage allowable for overhead expenses, the "summary" reads as follows:

> The summary figure for overhead and profit expressed as a percentage for addition to the salary or payroll cost varied with the type of work, the organization required and other conditions; and it also depends on the arrangement for allowance for "fringe benefits." The combined percentage for overhead and profit for average conditions is indicated in the manuals to be within the range of 75 to 150 percent applied to payroll cost, and from 100 to 200 percent applied to salary cost.

We are pleased to note that Federal agencies are utilizing private professional engineering consultants in an increasing number for tasks which are complex or highly specialized. This, we believe, represents the most effective utilization of engineering talent, both for the private consultant and federally employed engineers. In the space age in which we now find ourselves, one of the most critical problems facing our entire economy and defense effort is the most efficient utilization of available engineering talent.

That the rigid, impractical limit of any amount less than $100 per day does not assure the Government the services of necessary top-quality engineering consultants, is evidenced by the recent statutes creating both the National Aeronautics and Space Administration and the Federal Aviation Agency. Each of these organic legislative enactments contain provisions permitting a maximum per diem allowance of $100, thus indicating congressional awareness that to secure the type and quality of professional consulting services these agencies may require from time to time, a realistic maximum per diem amount of $100 must be permitted for such services.

The national society is not alone in advocating a $100 per diem compensation allowance for professional consulting engineering services. Many State societies of professional engineers have established recommended fee scheules, each of which calls for at least a $100 per diem rate.

In light of these facts, the National Society of Professional Engineers earnestly recommends that this subcommittee, in preparing the Defense Department appropriations bill for fiscal year ending in June 1960, recognize and give force and effect to the proposition that the Government's best interests in the long run will be served by allowing for a maximum per diem rate of $100 for the temporary services of professional experts and consultants.

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Another aspect of the question of professional consulting engineering fees on Federal projects has been brought to the fore in the House-approved Interior Department appropriations bill for fiscal year ending June 1960 (H.R. 5915). Although we appreciate the fact that appropriations for the Interior Department do not fall within the jurisdiction of this subcommittee, we nevertheless feel constrained to mention this matter inasmuch as the language involved and the committee report on H.R. 5915 seems to imply that the matter of which we speak may be proposed as a general limitation written into all pertinent appropriations measures.

We refer specifically to title IV, section 401 of that bill which reads as follows:

> Not to exceed 5 percent of the cost of any project constructed under the appropriations contained in this act may be expended for engineering and design of the project.

Commenting on this limitation in the report accompanying H.R. 5915 (H. Rept. No. 237), the committee declared that "the following limitations and legislative provisions not heretofore carried in connection with any appropriation bill are recommended." Then followed the language in section 401 to which we refer.

The 5 percent limitation would apply to "any project constructed under the appropriations contained in this act." Such an all-inclusive restriction, in our opinion, ignores the practical conditions which actually exist in the consulting engineering field, and instead, imposes what amounts to an arbitrary limitation regardless of the size and complexity of the project involved, contrary to basic considerations in the setting of reasonable and fair engineering fees. Recommended fee schedules, promulgated by many State and National engineering societies in an effort to insure full value and high-quality service to the client, and at the same time to afford the consultant reasonable compensation for his ability and judgment in the rendition of his professional service, generally classify construction projects by complexity, difficulty, special conditions or repetitive features for purposes of considering fees and possible percentage rates.

This concept is ignored in section 401 of H.R. 5915, and its serious consequences can perhaps be illustrated by reference to a situation which often occurs in engineering operations: To construct a road through thick timber area, or in particularly rugged terrain, it is necessary and economical in the long run to select the route with the aid of aerial photography and photogrammetric methods, using modern technological equipment. In such terrain, it may be found necessary to do an extensive amount of planning and designing for extensive cuts and fills, or an exceptional number of bridges may have to be designed. In conjunction with this type of situation, it should be borne in mind that the limitation is based on project cost and often the project (construction) cost may be quite low, as in the case of a timber road, while the engineering costs are relatively high. Conversely, the engineering design costs of a modern superhighway are low percentagewise because the construction cost may run into millions of dollars a mile.

The above discussion illustrates merely a few of the possibilities, but we believe it aptly illustrates the consequences to which we have alluded; namely, that an arbitrary 5 percent limitation for engineering on any project is completely impractical.

Furthermore, such a limitation would operate to the obvious disadvantage of the Federal agency involved in that the best qualified consulting engineers could not assume obligations under a 5 percent fee restriction. Such a result, we are certain, is not desired by the Congress.

For your further information with regard to this matter, your attention is invited to the charts on pages 7 and 9 of the summary which indicate a graduated scale of percentage fees, depending upon the estimated cost of the project, as well as other factors. These charts, we believe, show without doubt the complete unreasonableness and impracticality of an all-inclusive 5 percent limitation as is proposed in H.R. 5915, and as might be contemplated in appropriations for other Federal departments and agencies.

Experience has shown that the most equitable fee arrangements for both the Government and the consulting engineer are arrived at through negotiation based on generally accepted State and local schedules of engineering fees, and not on the basis of a fixed maximum fee limitation applicable to all projects. However, should it be the feeling of the Appropriations Committee, or any of its respective subcommittees, that a statutory limit be established, we further recommend that it not cover preliminary planning and estimates, preliminary surveys, economic feasibility studies and advance planning. Instead, the fee limitation, if any, should include only the preparation of design plans and specifications, supervision of construction, inspection and such resident engineering as may be required by the particular project.

On behalf of the National Society of Professional Engineers I sincerely urge your serious consideration of the two matters discussed here today—the problem of per diem allowances for experts and consultants, and the unreasonableness of a blanket-type 5 percent limitation for engineering and design services as contained in the Interior Department appropriations bill for 1960. We appreciate the opportunity of appearing before you and stand ready to elaborate on either of the points mentioned and to cooperate further with the subcommittee in any manner possible.

(Off the record.)

Mr. GOMPF. There are two principal points to which we are addressing ourselves. One is the per diem maximum which you appear to be considering as $50 a day and which we feel should be $100 a day. The reason this is so is that most of the consulting engineers Federal agencies call upon are people like myself, who operate an office, and who have to take time out from the office. There are items of overhead behind them. So we know absolutely that we cannot do a job for the Government on the basis of any amount less than $100 a day. Therefore, you have to call upon people who are not quite as well established and who, in the final analysis, do not provide an economical picture for the Government.

Mr. MAHON. Who do not provide what?

Mr. GOMPF. An economical service to the Government in that the quality of the work they are able to produce, the quality of the services they are able to give, is not of the level that the Government agencies should have and need.

When I say "not economical," what I mean relates probably more to the second part of what I wanted to talk about, and that is the percentage limitation.

Mr. MAHON. You do not like the percentage limitation. You point out in your statement why.

Mr. GOMPF. Yes, sir. Basically, the reason for both of these is simply this, sir: A little more money spent on engineering services can save a great deal in the construction contracts which follow. This is not a case of spending more money that we are appealing for. It is a case of making available to the Government a better quality of service, because in the long run it is the most economical to the Government.

Mr. MAHON. How do you advocate that we meet this problem? We have to agree it is a problem.

Mr. GOMPF. First we would like to ask you, sir, that the per diem limitation not be set at $50 a day but moved up to $100 a day.

Mr. MAHON. All right, next?

Mr. GOMPF. Second, that you not put a limitation of 5 percent as a percentage fee on any work designed outside of the Government agencies. Let the agency itself negotiate the fee on the basis of the complexity of the work and the size of the project. Those are the two things which should govern the engineering fee—the degree of complexity and the size of the job. Obviously a percentage fee based upon a $100,000 construction cost has to be at a higher percentage level than the fee which would be based on several million dollars.

Those, sir, are the two points we are presenting here. Our only argument for them is that they will produce and do produce, where they are permissible, a better quality of service for the Government and, in the long run, better economy for the Government.

Mr. MAHON. Any questions?

Mr. FLOOD. No questions.

Mr. MAHON. Any questions, gentlemen?

Mr. FORD. Just one question. What is the average fee that private industry pays in this area?

Mr. GOMPF. We have given you, I think, copies of some reports. In the gray binder, if you would look at page 9, there is a résumé of some 20 States. Indicated are the variations in the fees. Reading across, take Georgia, for example. A $100,000 job of average complexity—this is something we grade according to complexity—would start at a 7½ percent fee. Going over to a half million dollars, you move down in gradual steps to 6½ percent; $1 million, 5½ percent; and between $1 million and $10 million, you graduate from 5½ percent down to 5 percent. That is average complexity. There are simpler projects and there are more complicated projects.

Mr. FORD. That does not seem to answer my specific question, though, as to what it amounts to on a per diem basis.

Mr. GOMPF. The per diem is the other side of the picture. To answer you directly on that, about 2 weeks ago for one of the private companies between Maryland and New Jersey, I was paid $375 plus expenses, hotel, and transportation for 2 days' services.

Mr. FORD. Was that typical?

Mr. GOMPF. Yes, I would say so. People who are better qualified than I will certainly demand more than that. It would be a rare case in private industry where a consulting engineer would receive below $100 a day. The standard charge in our office on an hourly rate—we do not usually talk about daily rates—is $12. That may be for 8 hours or 10 hours or however long we devote.

Mr. FORD. That is all.

Mr. MAHON. Thank you very much for your helpful statement. There is some room for improvement in this area. This is not a legislative committee, as you know. You may have presented these matters to the Armed Services Committee of the House. We have limitations in the way of legislative provisos in an appropriation bill, but the place where legislation should be written is in the other committees, as you well know.

Mr. LUNCH. I am Milton F. Lunch, legislative counsel of the national society.

If I may interject, Mr. Chairman, we have presented similar views to the legislative committees, and last year, for instance, in the creation of the Federal Aviation Agency, the basic legislation established $100. The same was true of the new Space Agency. We are here at the invitation of this subcommittee, we assume, because in the annual Appropriations Act for the Defense Department there is a provision with regard to per diem rates for experts and consultants.

Mr. MAHON. Thank you very much. We are happy to have you.

PURCHASE OF MEAT FOR TROOPS OVERSEAS

L. BLAINE LILJENQUIST, LEGISLATIVE REPRESENTATIVE, WESTERN STATES MEAT PACKERS ASSOCIATION

Mr. LILJENQUIST. Mr. Chairman, I am L. Blaine Liljenquist, vice president of the Western States Meat Packers Association, Inc.

Mr. MAHON. We have had the privilege of hearing you before, and we are pleased to have you.

Mr. LILJENQUIST. Mr. Chairman and members of the committee, I would like to talk for just a moment or two on the provision in the appropriation for the Defense Department which is identified as section 624, and is found on page 534 of the President's budget request.

Section 624 is the restriction which provides that meat and some other foods and products should be purchased in the United States by the Armed Forces for U.S. troops overseas, provided these products are available in the United States in sufficient quantity. There is an escape clause which allows the Armed Forces to purchase these items overseas in the event of combat, or in event of emergency.

This restriction was placed in the budget shortly after World War II at a time when the Quartermaster was purchasing boatloads of beef from Argentina for shipment to our troops overseas.

The American National Cattlemen's Association and our association, with strong support also from various livestock and farm organizations, have favored this restriction, and I am appearing here today only because the President has requested that it be deleted.

Mr. MAHON. I understand that probably a pretty strong pitch is to be made this year to get this language out of the bill. Have you heard that?

Mr. LILJENQUIST. Yes. It has been our understanding that the offshore purchasing restriction has been expanded to include not only meats, but all foods and various other products, and has therefore become somewhat of a problem to the Defense Department. But with respect to meat, I do not believe it is a problem. We are the world's biggest commercial producer of meat and we produce the

finest meat in the world under sanitary conditions that are unequaled elsewhere. The quality of our meat is unsurpassed. The Army has found that it can purchase all of its meat requirements in the United States for overseas use.

We are particularly concerned about the four-way boneless beef which is a large item of supply for the Defense Department. They buy about 120 million pounds of this product annually.

Mr. FLOOD. When you say the Army, of course you mean the Army as a single purchasing unit for all the services.

Mr. LILJENQUIST. Yes, Congressman Flood. That is what I should have said.

We believe section 624 is a reasonable restriction on the Armed Forces because we do have supplies available. We believe the military should purchase meat from U.S. citizens who pay taxes for this purpose. It is of particular value in our industry because we have these heavy beef carcasses which can be used in military contracts. The four-way boneless meat can utilize the heavier carcasses, for which there is little demand in the domestic trade. Our regular commercial sale of beef in the United States today calls for the lighter carcasses, the smaller cuts; whereas the military would just as soon have the larger, heavier carcasses. They can use these larger cuts.

Mr. MAHON. I was under the impression these 2-year-old steers that have been run on grass for quite a while and then on milo or corn for a while really were tops.

Mr. LILJENQUIST. Qualitywise, they are tops. But for the regular commercial trade, many of those steers become too heavy and can be sold in the commercial and domestic markets only at a considerable discount. As a result of that, the military is able to purchase its meat at a lower cost because they can utilize these heavier steers.

PRIME BEEF

Mr. MAHON. For the fine restaurants of the country, what is preferred by way of a carcass?

Mr. LILJENQUIST. The most expensive restaurants and hotels, Mr. Chairman, like to use the Prime grade, which is the top grade. It is a grade which is a little too wasteful and too expensive for the housewives because it has so much fat and requires such long feeding to reach that degree of quality. Last year, of all the beef that was federally graded, only 4 percent reached the Prime grade, 40 percent reached the Choice grade, and 26 percent reached the Good grade.

Mr. MAHON. Of this 4 percent, what was the weight of the steer on foot?

Mr. LILJENQUIST. Because they have to be fed for such a long period of time, they are the heavy carcasses. They would be considerably heavier than beef of the Choice grade or the Good grade.

Mr. FLOOD. Would the top, choice, expensive grade cuts come from range steers; steers running on a range?

Mr. LILJENQUIST. No, Congressman Flood. The beef which the military buys is almost altogether in the Choice grade. They do take some beef in the Good grade. This is fine quality meat from cattle not held in the feed lots long enough to reach the Choice or Prime grades.

Mr. FLOOD. Regardless of who buys it, you do not get that choice quality and expensive cut from a range steer just out of a car; do you?

Mr. LILJENQUIST. No, sir. All of the beef that reaches the Choice and Prime grades must be held in a feed lot for quite a considerable period of time.

Mr. MAHON. I mentioned this matter of steers running on grass for quite a while. As I understand it, if you are going to get these big carcasses and this fine Prime beef, you do not think about putting cattle on heavy feed during the first year. It is during the second year that you put them on the heavy feed. You carry them on grass in order to prevent the mounting costs as long as you can before you give them the finishing touch for the last few months. Is that about correct?

Mr. LILJENQUIST. Yes, sir.

Mr. FLOOD. I understand that, but I did not want the record to show your impression—you were talking to the clerk at the minute, and I knew you did not mean that—that we were going to take a 2-year steer off the range and take him out of a car and get a Choice cut.

BEEF-PRODUCING STATES

Mr. FORD. Now we have the State of Nebraska, the Beef State, aroused.

Mr. WEAVER. I was just going to say I understood you to say that most of this choice beef is purchased by the Army, and I assume that it would come from Nebraska, the Beef State. Is that right?

Mr. LILJENQUIST. Mr. Congressman, Omaha is the second largest slaughtering center in the United States. It is next to Chicago. Los Angeles is now third.

Mr. FLOOD. Of cattle?

Mr. LILJENQUIST. Of all slaughter, of all species. Texas produces over 8 million head of beef cattle, Florida has less than 2 million and ranks, I think, 13th in total numbers of beef cattle.

Mr. MAHON. But Florida has quite a business in the production of certain types of beef; has it not?

Mr. LAIRD. Where did you say it ranks?

Mr. BOYLE. Thirteenth in number of cattle, but it is the second beef producing State in the Union, though.

Mr. LILJENQUIST. I am afraid not, Congressman. There are a number of States which produce more beef cattle than Florida.

Mr. MAHON. But Florida has come up tremendously in the last few years in beef production.

Mr. LILJENQUIST. Yes, sir.

Mr. FLOOD. They took these Brahmans out of Texas down there several years ago. They have that Texas strain in there now, and they are going to get big, you know. If you saw the size of most of that Florida cattle, you could see the need.

Mr. FORD. Despite the conscientious efforts of the military to buy Prime or Choice or Good beef, they do quite a job in the ruination of it in the process of preparing it for the table.

Mr. FLOOD. The gravy takes care of that.

Mr. LILJENQUIST. Our responsibility is to furnish them the grade and quality which they request. We hope that we shall be able to continue doing that by seeing section 624 continued in the budget. We hope that will be possible.

Mr. MAHON. Let me ask you more about this beef. You say 4 percent of the beef is Prime, and this Prime comes from the older cattle, say the 2-year-olds.

Mr. LILJENQUIST. Which is fed for a long period of time.

Mr. MAHON. Most of the beef you buy in reasonably good restaurants, which is not Prime, comes from what general type of cattle?

Mr. LILJENQUIST. That would be from the choice grade, from beef cattle which have been on feed anywhere from 90 days to 120 days.

Mr. MAHON. What is the average age of a beef animal when slaughtered?

Mr. LILJENQUIST. From 2 to 2½ years. In years past they were much older, but in recent years they have been marketed at an earlier age.

Mr. FLOOD. Isn't it true that much of that lesser grade beef of which we are now speaking, while fed after it is brought off the range, has run on the range on grass a long time, and is fed in the stockyards before final shipment for slaughter for 60 days, perhaps?

Mr. LILJENQUIST. Not so much in the stockyards as in commercial feedlots in the Far West, and on farms in the Midwest.

Mr. FLOOD. But very short, almost in transit, except 60 days, isn't that correct?

Mr. LILJENQUIST. To reach the choice grade, it is necessary to feed for a longer period of time.

Mr. MAHON. Approximately how long should you feed for Choice and Prime grades?

Mr. LILJENQUIST. For Choice grade, from 90 to 120 days; and for Prime up to 150 days and over.

Mr. MAHON. What is the average feeding span of slaughtered cattle which are fed?

Mr. LILJENQUIST. I would say approximately 100 days in the feedlots.

Mr. MAHON. What is the percentage of cattle that is slaughtered before being given this special feeding in the feedlot?

Mr. LILJENQUIST. Most of the beef consumed and purchased through the chainstores is the Choice grade, and 70 percent of all of the beef which is federally graded is in the top grades of Prime, Choice, and Good. Some standard beef is produced which is a very lean meat that does not have as high quality, juiciness, flavor, and good cooking characteristics.

Mr. MAHON. In rural America, which of course is getting smaller all the time, you have people who have a few cattle on the farm—Jersey, Holstein, Hereford, Angus—and while these cattle run on the pasture and are fed a little, they are not normally fed. I am trying to disassociate that group from the other group. Approximately how many cattle fall in that category?

Mr. LILJENQUIST. In the nonfed category?

Mr. MAHON. Yes.

Mr. LILJENQUIST. When you include your dairy stock, you would have approximately 40 percent of your cattle marketed without being fattened in the feed yards. Most of that beef goes into processed products. We term it manufacturing beef, which goes into frankfurters, luncheon meats, and a large variety of processed meats.

The bulk of the beef which is consumed as fresh beef is fed in our feed yards.

BLACK ANGUS CATTLE

Mr. FLOOD. What about this eastern seaboard Black Angus through Maryland and southeastern Pennsylvania, as compared to the different breed of cattle, Texas tough range cattle. Strike out the word "tough."

Mr. MAHON. They are tough in that they can survive bad conditions.

Mr. FLOOD. I meant to use it that way, but it will look bad in the record. You know what I mean. Here we have this beautiful big Black Angus, every steer looking like a show animal, along the eastern seaboard States for the beef market.

Mr. LILJENQUIST. Of the various beef cattle breeds that are in commercial production in the United States, just about all of those breeds will produce cattle that will reach the good, choice, and prime grades if they are fed sufficiently long to obtain that degree of marbeling which is necessary for those grades. The Angus cattle that we have here in Maryland and in other Eastern States is a very fine breed of livestock. They reach the choice and prime grades without difficulty.

Mr. MAHON. I think most Americans like beef, so you will pardon us if we have asked you some questions which were not directly in point. Thank you very much. You have been very helpful.

Mr. FLOOD. I am speaking for the consumer end of this transaction.

Mr. LILJENQUIST. Thank you, gentlemen.

Mr. MAHON. Look over your remarks to see that the real truth about beef is stated, because we want the American public to know the real truth about beef and to eat more of it.

Mr. LILJENQUIST. Thank you, sir.

DEFENSE DEPARTMENT USE OF COMMERCIAL AIR CARRIERS

WITNESSES

CLAYTON L. BURWELL, EXECUTIVE DIRECTOR AND GENERAL COUNSEL, INDEPENDENT AIRLINES ASSOCIATION
GEORGE TOMPKINS, PRESIDENT, OVERSEAS NATIONAL AIRWAYS
ROBERT L. TURNER, VICE PRESIDENT—TRAFFIC, AIR TRANSPORT ASSOCIATION OF AMERICA
LEO SEYBOLD, VICE PRESIDENT, AIR TRANSPORT ASSOCIATION OF AMERICA
HARVEY WEXLER, SPECIAL CONSULTANT, AIR TRANSPORT ASSOCIATION OF AMERICA

Mr. MAHON. We now have representatives of the Independent Airlines Association and of the Air Transport Association.

Will you identify yourselves for the record, please.

Mr. BURWELL. Mr. Chairman, I am Clayton L. Burwell, executive director of the Independent Airlines Association. I have with me, if he may sit with me, Mr. George Tompkins, president of Overseas National Airways, one of our member carriers which does a great deal of defense business, in case there are any questions.

Mr. MAHON. What was the extent of your business last year, dollarwise, with the Defense Department, Mr. Tompkins?

Mr. TOMPKINS. Referring to this fiscal year ending this coming June 30, I can quote that. About $4 million.

Mr. MAHON. $4 million for the fiscal year ending June 30. What was it the year before, approximately?

Mr. TOMPKINS. It was considerably less, Mr. Mahon, because at that time we did not have the new, modern airplanes which we now have. We had only older aircraft. It was negligible.

Mr. MAHON. How many airline companies are in the business now?

Mr. TOMPKINS. I think one indication might be there are 26 call contracts issued by MATS. That means that many carriers receive every invitation they have for what they term "call" business as compared to long-term, fixed contracts; in other words, for short-term requirements. I think at least 26 are involved in that.

Mr. MAHON. Do you have any way of separating the big airlines from the smaller airlines? What is the yardstick of separation?

Mr. TOMPKINS. Some of us qualify as small business concerns, and there has been in recent months, beginning last July 1, a set-aside for small business. So the only distinction I know of is the small business category, because all airlines are capable of going anywhere in the world. So size is only relative.

Mr. MAHON. What is the amount of business that all airlines are getting through MATS for fiscal year 1959, approximately?

Mr. TOMPKINS. There is some disagreement on that. It depends on how you calculate it. We calculate it will be somewhere between $60 million and $61 million.

Mr. MAHON. It was anticipated that the figure would be larger.

Mr. TOMPKINS. Yes, sir; it was.

Mr. MAHON. All right, proceed with your statement, Mr. Burwell.

Mr. BURWELL. Thank you, sir.

STATEMENT OF MR. CLAYTON L. BURWELL

My name is Clayton L. Burwell. I am executive director and general counsel of the Independent Airlines Association. This is an association of small air carriers, many of whose members got their experience flying for the Army, Navy, and Air Force; who again proved their value to the Nation as commercial participants in the Berlin, Korean, and Hungarian airlifts; and who today fly passengers and cargo for the U.S. military, as well as civilian charters and route-type operations on a limited scale.

Our member airlines are free from the rigid requirements of scheduled routes, and literally can fly any place at any time. This means a great deal to the Armed Forces, as attested in the following passage from a letter to the association from the Honorable Perkins McGuire, Assistant Secretary of Defense, under date of April 4, 1958:

> The preservation of those airlines comprising your association is of genuine concern to us. In any future military action, your group would unquestionably make a vital contribution.

Specifically, the Independent Airlines Association has 21 member airlines, most of whom are classified as supplemental air carriers by the CAB, and a list of whom are attached. You may know them as

"nonskeds," but the term has been inappropriate ever since the CAB created the category of supplemental air carriers in 1955.

We are drastically limited in the amount of civilian business we can do. This has nothing to do with safety, for our safety record is unmatched. The restrictions are purely economic. Hence, in order to survive—against the day we will again be needed in an emergency—we must rely on military business to a great extent. We fly for MATS; we fly troops domestically in commercial air movements (CAM's); and we participate in contract cargo hauls for the services, such as Logair, Quicktrans, and so forth. In all three categories our prices are among the lowest in the business.

It is regrettable, even deplorable, that MATS continues to operate in the commercial air transport field. MATS should be operating a logistics air fleet, not a plush airline. The fact uncovered by the Holifield committee last year that MATS employs 800 stewards and stewardesses dispels any doubt that MATS is engaged in commercial airline operations.

Furthermore, we note from Secretary Douglas' testimony before your subcommittee (chart, p. 914, part I, hearings) that instead of increasing commercial augmentation and reducing MATS own airlift services, just the opposite is true. MATS estimates it will spend only $54 million for commercial augmentation in fiscal 1960, a $26 million reduction from the $80 million specified in section 634 of the 1959 Defense Appropriation Act. It proposes to raise its own funds from $220.7 million to $234.7 million.

This trend flies in the face of your own committee warnings over the years against undue competition for private air carriers on the part of MATS. It flouts the position taken by the Senate committee last year that the disastrously declining share of MATS business going to commercial air carriers, particularly the smaller ones, should be reversed. It totally ignores the unanimous recommendation of the Holifield committee that MATS should get out of the commercial airline business and concentrate on special and outside cargo, leaving passengers and conventional freight to the commercial operators.

That the MATS problem is engaging the increasing attention of the Congress is shown not only by the exhaustive Holifield hearings and adoption of section 634 of the 1959 act, but also by the introduction recently of a bill to require that at least 50 percent of the passenger and cargo air transportation requirements of the U.S. Government be obtained from civil air operators.

It may well be that Congressman Holifield's committee has found the answer in its series of 22 recommendations. But legislation will not be proposed until MATS has demonstrated whether or not it will go along with the Holifield report. Furthermore, it will take time to obtain hearings and chamber action on the so-called 50–50 bill. Meanwhile, the appropriation process goes on, and the bill before you provides the only present vehicle for Congress to deal with MATS.

We urge that your subcommittee recommend reenactment of section 634 of the 1959 Defense Appropriation Act, but with $100 million substituted for the $80 million earmarked for commercial service, and that this figure be made a minimum, not a maximum. The language stressing the use of small-business air carriers should be preserved, since these carriers are airlift minutemen who unfortunately get over-

looked if MATS is not required to consider them in making awards during peacetime.

Why $100 million? Because this figure is is only a little over one-third of the nearly $289 million estimated industrial fund expense of MATS during fiscal 1960. The Air Force itself has stated that the civil reserve air fleet would be depended upon for 40 percent of the national wartime requirements, and MATS 60 percent. If the civil fleet is to be relied upon for 40 percent of the emergency airlift, 30 percent of the peactime airlift is not an excessive amount of training experience. It should be considered a bare minimum.

Permit me to make three additional points about MATS.

(1) The Air Force is asking you for funds to purchase 10 turbojet transports, presumably the so-called swing-tail versions of the DC–8 or Boeing 707. These aircraft will probably be convertible—i.e., changeable from cargo to passenger configuration—and if assigned to MATS will undoubtedly see much service as plushed-up jet airliners. This is not the type of airplane for outsize cargo, as recommended by the Holifield committee. It is an airline airplane. (However, if these craft are to be assigned directly to the Strategic Air Command rather than MATS we can have no quarrel with it and do not criticize it.)

(2) Since Alaska's admission as a State, the CAB (with Justice Department approval) has classified travel between Alaska and the other 48 States as interstate. When Alaska was a territory, such travel was called overseas. However, MATS continues to handle military traffic to and from Alaska as single manager for overseas, international, and foreign air transportation. MATS is presumed not to fly domestically, that is, between States. But it still holds on to the Alaskan business, whereas we are convinced it should be placed under the single manager for domestic transportation, the Military Traffic Management Agency (MTMA). The important difference here is that MTMA has no airplanes; it is simply a routing agency for the various services, who then contract with the selected commercial air carrier. MATS, with its own airplanes, contracts out only a portion of its business. By holding on to Alaskan traffic, augmenting it commercially only as it sees fit, it is depriving commercial air carriers of business which is rightfully theirs. We urge your committee to require MATS to cease this practice and to comply with the CAB-Justice Department policy.

(3) Finally, Secretary Douglas testified (p. 912, hearings, pt. I) that at that time, February 18, MATS had obligated $62 million of the $80 million specified in section 634. Since an additional $8 million of commercial service was procured by MATS subsequent to Mr. Douglas' statement, presumably the claimed total as of today would be $70 million. But much of this amount, some $10 to $11 million, is for performance during the first quarter of fiscal 1960 (July, August, and September 1959). So, the total for fiscal 1959 even today, which we calculate at approximately $61.9 million, is below the figure Mr. Douglas gave you over 2 months ago. Frankly, we frequently get into this involved numbers game with MATS, and only you gentlemen can straighten them out.

This concludes our testimony with respect to MATS. Permit me briefly to cover three other points, all bearing directly on economy in military travel.

(1) We wish to congratulate the Air Force for its statement, "Time Saved Moving Personnel and Cargo by Air," which was inserted in part I of the hearings at page 914, and particularly the sentence:

The Air Force considers it to be most important to hold to a minimum intransit time of personnel and cargo consistent with logistics requirements.

This policy is in accord with statements issued by conference committees and the Senate committee in years past that—

In evaluating relative costs of transportation, the Department of Defense should recognize the specific monetary value of time saved as an important factor in the award of competitive bidding in transportation.

The problem here is that while the Air Force is abiding by the policy, the Department at which the directive was aimed, the Defense Department, has apparently done little to insure its compliance among the other services. The Army, particularly, despite its frequent demands for more speed and mobility, seems bound to a 19th century policy of surface travel which day after day results in a 5-day "loll" across the continent by many thousands of Army troops. Again, the Air Force realizes the waste involved in this practice when it says in its statement:

By reducing the intransit time in personnel movements the Air Force gains the equivalent man-days for productive effort.

We hope that the Congress this year will put some "teeth" into this directive which it has repeated in varying forms for several sessions past.

We can find no better statement of the economy considerations involved in this matter than this quotation from Senate Report 1937, dated July 24, 1958:

Costs cannot be considered comparable if the monetary value of the inherent advantage of any mode of transportation is omitted from calculations leading to the expenditure of transportation funds.

(2) The military practice of allowing 6 cents a mile travel allowance to military personnel on permanent change of station was strongly objected to by the Hoover Commission in its 1955 report. We find it equally objectionable, since if these personnel were moved in groups the Government would achieve the advantage of 3 cents a mile travel, or exactly half the cost of the mileage allowance. The cost of 6 cents a mile travel allowance was found by the Hoover Commission to be $128.4 million in fiscal year 1954.

We recommend that your committee direct the services so to manage their change-of-station traffic that maximum use be made of the 3-cent-a-mile commercial air movements (CAM's) plane-load charters. Apparently, this traffic is not controlled by the Military Traffic Management Agency (MTMA) in Washington but by individual transportation officers of the various services at posts throughout the country and under authority of the DOD Joint Travel Regulations.

One of the most used arguments in favor of the 6 cents a mile practice is that it is a morale builder. But the Hoover Commission felt that despite this the practice was objectionable.

The Hoover Commission found that—

travel funds advanced for official travel were being used for other purposes and the volume of emergency transportation requests issued, at stations en route, to persons in embarrassed financial circumstances reached a prohibitive state.

Only 50 percent of such expenditures were found to be recovered during the 4-year period in 1951–54. A total of $2.6 million was due the Government. It would not be amiss for your committee to request a current accounting.

But perhaps the most telling argument against the 6 cents a mile practice is found in this passage from the Hoover report:

> The military organizations' spokesmen make frequent use of the argument, in support of various functions, that practice and experience during peacetime are required to make ready for war or emergency. In such emergency the "easy touch" 6 cents per mile travel allowance would of necessity vanish overnight, inexperienced transportation officers would call desperately for overlooked and neglected forms of transportation, and rusty * * * practices would have to be revived.

The plane-load charter business of members of our association recently dropped off 40 percent because of increasing emphasis on the 6 cents a mile practice by the Army and Air Force. If this continues, the country will soon lose a most valuable national defense asset.

3. Recently Congressman Tollefson publicly criticized de luxe air transportation for Federal employees. We support his criticism. There would be a great saving to the taxpayer if economy class were used routinely, because of the large volume of Government personnel traveling.

We urge your committee to require the military services to use economy class service as a matter of policy, except in cases of overriding circumstances.

Congressman Tollefson correctly pointed out that while most of the economy class passengers on overseas and domestic commercial flights are businessmen and other plain citizens, most of the deluxe passengers are U.S. Government personnel, including military. He properly noted that the difference in fares is substantial.

In this connection, I have attached to my testimony an analysis of DOD passenger travel within the continental United States for the fiscal years 1956, 1957, and 1958. Anyone studying this should bear in mind that air coach travel (economy class) now accounts for more than 50 percent of all air travel in the country. In other words, over half the American public prefers air coach to first class (de luxe). Should Government personnel, traveling at public expense, have more sumptuous service than the people themselves prefer or can afford?

It seems to us that the Government is wasting a lot of money by sending 858,000 passengers by first class air (1957 figures) and only 120,800 by air coach. Note that the difference in fare per passenger-mile is the difference between 5.5 cents and 4.6 cents or 0.9 cent per mile. Multiply this difference by the total number of passenger-miles flown (825 million) and the result would have been a saving to the taxpayer of nearly $7½ million in 1957 domestic military travel alone. Current applicable rates would show even greater savings.

These savings seem even more desirable when it is realized that a great deal of coach travel is in the same airplane with the same crew and on the same schedule as the so-called first class or de luxe travel. In many instances the cost differential is merely for fancy food, a $30 cocktail, and a bit of worthless red carpet.

Even greater savings would accrue if military transportation officers were required to group passengers into groups of 15 or more in order to take advantage of charter planeload rates.

Obviously, we have a business interest in the indiscriminate use of de luxe air travel by Government personnel. It was our industry that pioneered the air coach experiment. It filled a great need in air transportation. Air coach is an economy service, yes, but it is truly first class in every respect, using the same kind of equipment as the luxury flights and the same competent flying personnel. All it lacks are the caviar and champagne frills, and if it's good enough for all our collective Aunt Minnies, it ought to be good enough for our fighting forces.

Thank you for the time given me today.

If I can leave you with one thought, it is this:

The independent airlines want to make their equipment, facilities, and know-how available for rapid achievement of greater mobility of our Armed Forces and a speedier supply system, while leaving to the uniformed air transport services the type of tactical, strategic, and logistics operations they were created for. Economy and preparedness will inevitably result.

(The following material was submitted for the record:)

INDEPENDENT AIRLINES ASSOCIATION MEMBER CARRIERS

Airline Transport Carriers, d.b.a. California Hawaiian Air Lines, Burbank, Calif.
All American Airways, Inc., Miami, Fla.
American Flyers Airline Corp., Fort Worth, Tex.
Arctic-Pacific, Inc., Oakland, Calif.
Aviation Corp. of Seattle, d.b.a. Westair Transport, Seattle, Wash.
Capitol Airways, Inc., Nashville, Tenn.
Central Air Transport, Inc., North Hollywood, Calif.
Coastal Cargo Co., Inc., West Trenton, N.J.
Currey Air Transport, Ltd., Burbank, Calif.
General Airways, Inc., Portland, Oreg.
Great Lakes Airlines, Inc., Burbank, Calif.
Miami Airline, Inc., Greensboro, N.C.
Modern Air Transport, Inc., Newark, N.J.
Purdue Aeronautics Corp., Lafayette, Ind.
Quaker City Airways, Inc., Philadelphia, Pa.
Regina Airlines, Miami Springs, Fla.
S.S.W., Inc., d.b.a. Universal Airlines, Sherman Oaks, Calif.
Transocean Air Lines, Oakland Calif.
Twentieth Century Aircraft, Inc.,[1] d.b.a. Twentieth Century Airlines, Sun Valley, Calif.
The Unit Export Co., Burbank, Calif.
U.S. Aircoach, Burbank, Calif.
World Airways, Inc., Oakland, Calif.

[1] Contract.

Department of Defense passenger travel within the continental United States (passengers traveling by commercial carriers on transportation requests), fiscal year 1958

Mode of transportation	Transportation requests	Passengers		Passenger-miles		Transportation charges		Average fare per—		Average journey per passenger
		Number	Percent	Number	Percent	Dollars	Percent	Passenger	Passenger-mile	
				Thousands		*Thousands*				
Fiscal year 1958	1,256,600	4,134,200	100.0	2,233,500	100.0	100,200	100.0	$24.23	$0.0448	540
Rail [1]	443,900	1,117,400	27.0	750,300	33.6	30,200	30.1	26.98	.0402	671
Commercial air	461,700	1,176,300	28.5	[2] 1,213,700	54.3	63,700	63.6	54.14	.0525	1,032
Bus	351,000	1,840,500	44.5	269,500	12.1	6,300	6.3	3.44	.0235	146
4th quarter	352,300	970,500	100.0	531,700	100.0	25,200	100.0	26.00	.0475	548
Rail [1]	112,700	235,300	24.2	140,000	26.3	5,800	23.0	24.69	.0415	595
Commercial air	141,100	338,000	34.8	[2] 334,300	62.9	18,100	71.8	53.56	.0541	989
Bus	98,500	397,200	41.0	57,400	10.8	1,300	5.2	3.32	.0230	144
3d quarter	269,600	854,600	100.0	462,700	100.0	20,900	100.0	24.47	.0452	541
Rail [1]	99,700	205,300	24.0	149,600	32.3	6,000	28.8	29.33	.0403	729
Commercial air	101,700	255,100	29.9	[2] 266,500	57.6	13,700	65.7	53.87	.0516	1,044
Bus	68,200	394,200	46.1	46,600	10.1	1,200	5.5	2.92	.0247	118
2d quarter	300,500	1,065,200	100.0	556,300	100.0	24,600	100.0	23.12	.0443	522
Rail [1]	109,700	280,500	26.3	194,600	35.0	8,100	32.9	28.85	.0416	694
Commercial air	99,800	266,200	25.0	[2] 284,000	51.0	14,700	59.7	55.25	.0518	1,067
Bus	91,000	518,500	48.7	77,700	14.0	1,800	7.4	3.52	.0235	150
1st quarter	334,200	1,243,900	100.0	682,800	100.0	29,500	100.0	23.63	.0431	549
Rail [1]	121,800	396,300	31.9	266,100	39.0	10,300	34.8	25.81	.0384	671
Commercial air	119,100	317,000	25.5	[2] 328,900	48.2	17,200	58.3	54.05	.0521	1,038
Bus	93,300	530,600	42.6	87,800	12.8	2,000	6.9	3.83	.0232	165

[1] Includes Pullman service.
[2] Air passenger-miles are surface miles reduced by 18 percent.

Source: Reports submitted by the military departments in compliance with BOD Instructions No. 4500.15.

Department of Defense passenger travel within the continental United States by method of transportation (passengers traveling by commercial carriers on transportation requests), fiscal year 1958

Method of transportation	Transportation requests	Passengers		Passenger-miles		Transportation charges		Average fare per—		Average journey per passenger
		Number	Percent	Number	Percent	Dollars	Percent	Passenger	Passenger-mile	
				Thousands		*Thousands*				
Fiscal year 1958, total	1,256,600	4,134,200	100.0	2,233,500	100.0	$100,200	100.0	$24.23	$0.0448	540
Rail [1]	443,900	1,117,400	27.0	750,300	33.6	30,200	30.1	26.98	.0402	671
1st class	288,700	633,600	15.3	503,600	22.5	23,600	23.6	37.32	.0470	795
Coach	150,800	331,900	8.0	77,600	3.5	2,300	2.2	6.80	.0291	234
Special section 22	4,400	151,900	3.7	169,100	7.6	4,300	4.3	27.98	.0251	1,113
Commercial air	461,700	1,176,300	28.5	[2] 1,213,700	54.3	63,700	63.6	54.14	.0525	1,032
1st class	412,800	850,300	20.6	[2] 793,400	35.5	44,800	44.7	52.72	.0565	933
Coach	43,800	131,600	3.2	[2] 168,800	7.5	8,000	8.0	60.58	.0472	1,283
Charter	5,100	194,400	4.7	[2] 251,500	11.3	10,900	10.9	56.00	.0433	1,294
Bus	351,000	1,840,500	44.5	269,500	12.1	6,300	6.3	3.44	.0235	146
Regular	335,100	705,200	17.1	107,500	4.8	2,400	2.4	3.36	.0220	152
Special section 22	15,900	1,135,300	27.4	162,000	7.3	3,900	3.9	3.49	.0244	143

[1] Includes Pullman service.
[2] Air passenger-miles are surface miles reduced by 18 percent.

Source: Reports submitted by the military departments in compliance with BOD Instructions No. 4500.15.

TABLE 1.—*Department of Defense passenger travel within the continental United States*

FISCAL YEAR 1957

	Mode of transportation	Number of transportation requests	Number of passengers	Number of passenger-miles	Total transportation charges (value of TR's)	Journey per passenger (miles)	Average cost per passenger	Average transportation fares per passenger-mile
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Rail transportation:							
2	Rail service:							
3	1st class	265,260	768,519	613,125,499	$20,718,657	798	$23.96	$0.0338
4	Coach	173,918	391,637	97,021,820	2,695,518	248	6.88	.0278
	Charter (sec. 22)	4,014	229,556	302,524,104	9,809,158	1,318	42.73	.0324
5	Total	443,192	1,389,712	1,012,671,423	33,223,333	729	23.91	.0328
6	Pullman service:							
7	Standard berth	64,495	651,829	513,031,793	5,709,534	787	8.76	.0111
8	Tourist berth	3	70	176,959	1,498	2,528	21.40	.0085
8a	Charter	321	9,646	12,493,805	84,664	1,295	8.78	.0068
9	Seat	18,071	67,865	13,077,360	133,500	193	1.97	.0102
10	Total	82,890	729,410	538,779,917	5,929,196	739	8.13	.0110
11	Commercial air transportation:							
12	1st class	410,907	858,405	825,270,108	45,406,840	961	52.90	.0550
13	Coach	35,712	120,806	158,313,585	7,337,704	1,310	60.74	.0463
	Charter	5,139	198,189	266,718,707	10,215,950	1,346	51.55	.0383
14	Total	451,758	1,177,400	1,250,302,400	62,960,494	1,062	53.47	.0504
	Bus transportation:							
15	Regular	341,283	800,707	119,102,448	2,379,117	149	2.97	.0200
16	Charter	15,374	1,191,615	169,563,235	4,006,086	142	3.36	.0236
17	Total	356,657	1,992,322	288,665,683	6,385,203	146	3.20	.0221
	5 plus 10 plus 14 plus 17	1,334,497			108,498,226	560	23.80	.0425
	5 plus 14 plus 17		4,559,434	2,551,639,506				

SOURCE: The information contained in this table is obtained from the reports submitted by the military departments in compliance with DOD Instruction No. 4500.15. The basis of the material used is a sample of the transportation requests paid during fiscal year 1957. Passenger-miles for commercial air transportation are surface passenger-miles reduced by 18 percent. Passenger-miles for rail and bus transportation are based on surface mileage.

FISCAL YEAR 1956

	Mode of transportation (1)	Number of transportation requests (2)	Number of passengers (3)	Number of passenger-miles (4)	Total transportation charges (value of TR's) (5)	Passengers per transportation request (6)	Journey per passenger (miles) (7)	Average transportation fares per passenger-mile (cents) (8)
	Rail transportation:							
1	Rail service:							
2	1st class	272,903	833,714	687,782,804	$21,859,846	3.05	825	3.18
3	Coach	172,275	398,586	116,593,762	3,013,668	2.31	293	2.58
4	Section 22	4,636	416,009	599,490,323	9,824,598	89.73	1,441	1.64
5	Total	449,814	1,648,309	1,403,866,889	34,698,112	3.66	852	2.47
6	Pullman service:							
7	Standard berth	119,031	709,824	595,149,228	5,883,814	5.96	838	.99
8	Tourist berth		110	279,930	1,845		2,545	.66
9	Seat	25,556	76,665	13,064,008	111,863	2.99	170	.86
10	Total	144,587	786,599	608,493,161	5,997,522	5.44	774	.99
	Commercial air:							
11	1st class	374,895	785,312	753,247,400	41,845,820	2.09	959	5.56
12	Coach	22,858	70,186	89,334,853	4,008,413	3.07	1,273	4.49
13	Charter	4,227	153,207	225,039,321	8,655,512	36.24	1,469	3.85
14	Total	401,980	1,008,705	1,067,621,574	54,509,745	2.51	1,058	5.11
	Bus transportation:							
15	Regular	492,032	1,141,420	160,752,181	3,279,853	2.31	141	2.04
16	Charter	18,167	1,364,719	186,072,273	4,331,485	75.12	136	2.33
17	Total	510,199	2,506,139	346,824,454	7,611,338	4.91	138	2.19
	5 plus 10 plus 14 plus 17	1,506,580			102,816,717	3.43	546	3.65
	5 plus 14 plus 17		5,163,153	2,818,312,917				

Source: The information contained in this table is obtained from the reports submitted by the military departments in compliance with DOD Instruction No. 4500.15. The basis of the material used is a sample of the transportation requests paid during fiscal year 1956. Passenger-miles for commercial air transportation are surface passenger-miles reduced by 18 percent. Passenger-miles for rail and bus transportation are based on surface mileage.

TABLE 2.—*Department of Defense passenger travel within the continental United States*

FISCAL YEAR 1957—PERCENTAGE CHANGE OVER FISCAL YEAR 1956

	Mode of transportation	Number of transportation requests	Number of passengers	Number of passenger-miles	Total transportation charges (value of TR'S)	Average transportation fares per passenger-mile
	(1)	(2)	(3)	(4)	(5)	(6)
	Rail transportation:					
1	Rail service:					
2	1st class	−2.80	−7.82	−10.85	−5.22	+6.29
3	Coach	+.95	−1.74	−16.79	−10.56	+7.75
4	Section 22	−13.42	+10.36	+.92	−.16	−1.22
5	Total	−1.47	−3.51	−8.28	−4.25	+4.46
6	Pullman service:					
7	Standard berth	−45.82	−8.17	−13.80	−2.96	+12.12
8	Tourist berth		−36.36	−36.79	−18.81	+28.79
9	Seat	−29.29	−11.48	+.10	+19.34	+18.60
10	Total	−42.67	−7.27	−11.46	−1.14	+11.11
	Commercial air transportation:					
11	1st class	+9.61	+9.31	+9.56	+8.51	−1.08
12	Coach	+56.23	+72.12	+77.21	+83.06	+3.12
13	Charter	+21.58	+29.36	+18.52	+18.03	−.52
14	Total	+12.38	+16.72	+17.11	+15.50	−1.37
	Bus transportation:					
15	Regular	−30.64	−29.85	−25.91	−27.46	−1.96
16	Charter	−15.38	−12.68	−8.87	−7.51	+1.29
17	Total	−30.10	−20.50	−16.77	−16.11	+.91
	Grand total	−11.42	−7.99	+1.31	+5.52	+4.17

FISCAL YEAR 1956—PERCENTAGE CHANGE OVER FISCAL YEAR 1955

	Rail transportation:					
1	Rail service:					
2	1st class	−17.26	−17.56	−20.43	−18.41	+2.58
3	Coach	−25.54	−32.08	−42.14	−41.90	+.39
4	Section 22	−6.87	+13.56	−4.03	+7.15	+11.56
5	Total	−20.56	−16.10	−16.96	−15.68	+1.65
6	Pulman service:					
7	Standard berth	−71.53	−21.83	−24.65	−23.86	+1.02
8	Tourist berth		−92.55	−91.71	−92.10	−2.94
9	Seat	−68.25	−9.58	−25.44	−22.87	+3.61
10	Total	−71.06	−20.89	−24.95	−24.05	+2.06
	Commercial air transportation:					
11	1 st class	+5.40	+3.12	+9.27	+4.93	−3.97
12	Coach	+11.09	+5.05	+6.72	+1.54	−4.87
13	Charter	−64.23	−65.25	−65.50	−63.19	+6.94
14	Total	+3.58	−20.53	−25.10	−19.05	
	Bus transportation:					
15	Regular	−13.70	−15.37	−15.99	−15.20	+.99
16	Charter	−34.66	−42.81	−32.31	−32.71	−.43
17	Total	−14.67	−32.90	−25.61	−26.14	−.90
	Grand total	−26.58	−25.91	−21.33	−18.85	+3.11

NOTE.—Line 8a, pullman service, charter, was omitted from this table as there were no entries in the fiscal year 1956 report for comparison with the fiscal year 1957 totals.

TABLE 3.—*Department of Defense travel within the continental United States*

FISCAL YEAR 1957—PERCENTAGE DISTRIBUTION

	Mode of transportation	Number of transportation requests	Number of passengers	Number of passenger-miles	Total transportation charges (value of TR'S)
	(1)	(2)	(3)	(4)	(5)
	Rail transportation:				
1	Rail service:				
2	First class	19.88	16.86	24.03	19.09
3	Coach	13.03	8.59	3.80	2.48
4	Section 22	.30	5.03	11.85	9.04
5	Total	33.21	30.48	39.68	30.61
6	Pullman service:				
7	Standard berth	4.83	(46.90)	(50.66)	5.26
8	Tourist berth	(1)	(0.01)	(0.02)	(1)
8a	Charter	.02	(0.70)	(1.23)	.08
9	Seat	1.35	(4.88)	(1.29)	.12
10	Total	6.20	(52.49)	(53.20)	5.46
	Commercial air transportation:				
11	First class	30.81	18.84	32.35	41.87
12	Coach	2.67	2.64	6.20	6.76
13	Charter	.38	4.34	10.46	9.42
14	Total	33.86	25.82	49.01	58.05
	Bus transportation:				
15	Regular	25.58	17.56	4.66	2.19
16	Charter	1.15	26.14	6.65	3.60
17	Total	26.73	43.70	11.31	5.88
	Grand total	100.00	100.00	100.00	100.00

FISCAL YEAR 1956—PERCENTAGE DISTRIBUTION

	Rail transportation:				
1	Rail service:				
2	1st class	18.11	16.15	24.40	21.26
3	Coach	11.44	7.27	4.14	2.93
4	Sec. 22	.31	8.05	21.27	9.56
5	Total	29.86	31.92	49.81	33.75
6	Pullman service:				
7	Standard berth	7.90	(43.06)	(42.39)	5.72
8	Tourist berth	----------	(.01)	(.02)	----------
9	Seat	1.70	(4.65)	(.93)	.11
10	Total	9.60	(47.72)	(43.34)	5.83
	Commercial air transportation:				
11	1st class	24.88	15.21	26.73	40.70
12	Coach	1.52	1.36	3.17	3.90
13	Charter	.28	2.97	7.98	8.42
14	Total	26.68	19.54	37.88	53.02
	Bus transportation:				
15	Regular	32.66	22.10	5.70	3.19
16	Charter	1.20	26.44	6.61	4.21
17	Total	33.86	48.54	12.31	7.40
	Grand total	100.00	100.00	100.00	100.00

[1] Less than 0.005 percent.

( ) Percentage of total rail transportation. Not included in grand total as the pullman passengers and passenger-miles included in the rail figures.

Mr. MAHON. Your statement has been most interesting and helpful, Mr. Burwell.

It seems to me, Mr. Turner, if we heard you at this time, we would get a broader picture of this whole thing, and then could interrogate together.

Mr. TURNER. Mr. Chairman, I have with me on my left Mr. Leo Seybold, who is vice president of ATA, and on my right is Mr. Harvey Wexler, who is an ATA economist and an expert in this area. With your permission, I would like them to stay up here with me.

Mr. MAHON. Will you proceed with your statement, Mr. Turner. We are pleased to have you before us again, and we shall listen with interest to you as we have listened to Mr. Burwell.

Mr. TURNER. Thank you, sir.

STATEMENT OF MR. ROBERT L. TURNER

I am Robert L. Turner, vice president, traffic, of the Air Transport Association of America.

I wish to thank the committee for this opportunity to present certain matters which we believe are of national significance.

The Air Force has in its fiscal year 1960 procurement budget an item of $66 million for 10 jet transport aircraft. The information provided to date by the Air Force, including public testimony before this committee, fails to make clear the intended purpose for which this purchase authorization is sought.

The question reduces itself to a clear-cut issue—are the proposed 10 jet transport airplanes to be an integral part of combat forces and the weapons system, or are they intended to be used to further develop and expand the Government's competition with the commercial airlines, in contravention of established national policy?

Mr. MAHON. All the testimony with respect to these proposed planes has not yet been made available. There will be other testimony. Am I to assume that you think at this time, when the Nation is going in the red to the extent of about an average of $1 billion a month, we might possibly delay appropriation for these 10 aircraft?

Mr. TURNER. Either delay or eliminate, depending on what they are intended to be used for, Mr. Chairman. If I may, I think we can develop this in our testimony.

Mr. MAHON. Yes.

Mr. TURNER. Let us briefly examine these alternatives.

It has been frequently testified and publicly announced that support airlift for the combat forces must be instantaneously available because the reaction time in modern warfare has been reduced to a matter of minutes. If these 10 jet transport aircraft are to be used to provide instantaneously available airlift, it should be well understood by all that this may require a major change in current Defense Department policies with respect to the assignment, location, and mode of operation of transport aircraft.

At the present time, the MATS strategic air transport fleet is engaged in conducting an immense global airline, the largest in the world. As a result, this fleet is dispersed throughout the world in the same manner as an international commercial airline, and accordingly cannot be available to meet the instantaneous requirement. Only

a small portion of the MATS fleet at best could be instantaneously available to support the combat forces, which, according to military spokesmen, is the primary air transport mission of MATS.

It is obvious, therefore, that if these 10 jet transport aircraft are to be used and held in reserve to meet the instantaneous requirement, the aircraft must be located with the traffic they are to carry when the bell rings. In addition, these aircraft would have to be exercised with and used exclusively for the combat forces they are to support. Only thus can they be maintained in a state of operational readiness and in the same posture as the combat forces. It is only under these conditions that they could be regarded as truly part of the weapons system.

On the other hand, if these jet transports are to be used for the purpose of modernizing and continuing the operation of the MATS fleet in its present manner, the result will be a perpetuation of present wastefulness and lack of adherence to national policy. In such case, it should be recognized that the purchase of 10 airplanes would be only a first installment on a MATS reequipment program which could require a total expenditure of a billion dollars in the next few years.

Such a program would be wasteful because that airlift capability can be provided by the civil airlines and made available to meet defense air transportation requirements with little, if any, capital investment by the Department of Defense. We have recommended that the Department of Defense should use its tremendous pool of traffic as a means of encouraging the airlines, rather than discouraging as is currently the case, to invest their own capital in the acquisition of additional or different aircraft which would broaden the capabilities of the commercial air transport system for both peacetime and national emergency.

All that is required is to enforce established national policy with respect to international and oversea operations of MATS. That national policy is one which condones Government operation only when goods or services produced by free enterprise are not available. In other words, it is the established national policy that the Government shall not compete with free enterprise. The application of this policy to the international operations of MATS would be consistent with the way the Department of Defense meets most domestic air, all domestic surface, and most of its international surface transportation requirements.

As has been recognized by many, the MATS strategic transport fleet is primarily devoted to and engaged in moving normal traffic—passengers, cargo, and mail—just as the airlines are. The types of traffic handled by MATS and the areas served by MATS are, in large measure, the same as those which the airlines were authorized to handle and serve under the regulatory system established by Congress. The traffic handled by MATS enjoys no special status under the Federal Aviation Act, and hence should be made available for carriage by the airline system which, according to the act, is designed to meet the needs of U.S. commerce, postal service, and national defense.

We tried diligently to persuade the Department of Defense to change this policy, and to show that it would be in the national interest to do so. On November 20, 1958, we submitted to the Department of Defense detailed recommendations in this field, demonstrating

clearly that rather than operating its own worldwide air transport system, the Department of Defense should place primary reliance for the movement of military traffic upon the established airlines.

On December 31, 1958, we submitted to the Department of Defense a detailed study which clearly demonstrated the operational feasibility of our recommendations, i.e., that the Department of Defense traffic could be handled more efficiently and effectively by the regularly scheduled and supplemental air carriers, each operating in its appropriate sphere, than through the operation of a Government airline completely outside the system prescribed by the Congress.

In a letter to the Department of Defense, dated March 27, 1959, we indicated that acceptance and implementation of our recommendations would be not only within the Department's financial ability but would, in fact, be more economical than present policies. In addition, we showed that our recommended program would improve the national defense posture.

Without taking up your time here, Mr. Chairman, we submit copies of the three letters I have just mention for the record if you would care to accept them.

I offer them now if you would like to have them.

Mr. MAHON. We would be glad to have them.

(The letters referred to follow:)

NOVEMBER 20, 1958.

Hon. PERKINS MCGUIRE,
Assistant Secretary of Defense (Supply and Logistics),
Department of Defense, Washington, D.C.

DEAR MR. MCGUIRE: Here is a memorandum which I promised some time ago to send you, which states our views with respect to the air movement of military traffic.

Cordially,

S. G. TIPTON.

TRANSPORTATION OF DEFENSE DEPARTMENT AIR TRAFFIC

Submitted by Air Transport Association on behalf of its Transatlantic, Transpacific and Alaskan Members

This paper, which is submitted in connection with the current review by the Department of Defense of its methods of meeting its air transportation requirement, concludes that two practices now followed by the Department are unsound. First, instead of utilizing the air transport system established in accordance with Federal law, the Department operates its own airline—now the largest in the world. Second, to the extent that the Department utilizes commercial aircraft for the movement of its traffic, it does so for the most part under a contract procurement practice which is outside of the regulatory scheme prescribed by Congress.

These practices are not only inconsistent with that regulatory scheme but they prevent the most effective employment of our national air transport resources and hamper the development of airlift capacity necessary to meet national emergency requirements.

To bring its practices in line with the policy enunciated by Congress in the Civil Aeronautics Act and with the President's civil air policy, and to provide most effectively for the national defense, the Department of Defense should adopt the six recommendations which appear on pages 6, 7, and 8 below.

INTRODUCTION

The Department of Defense currently has under review methods which it has followed in meeting its air transportation requirements. These methods had their genesis in emergency situations which developed after World War II, and particularly during the Korean war. While they may have been the best, and

possibly the only, methods readily available at the time to meet those situations, this is no longer the case. On the contrary, without any well-conceived plan, these methods have developed into a series of practices which are fundamentally unsound. This is particularly true in the oversea and international fields.

In order to view the problems in their proper perspective, it is essential to keep in the foreground the fact that most of the air traffic for which the Department of Defense is responsible is the same sort of traffic as that which moves on the scheduled services of the airlines certificated to operate the worldwide system which has been established pursuant to the Civil Aeronautics Act of 1938.[1] This Department of Defense traffic has no special requirements or characteristics which differentiate it from the other traffic carried on those services, and it enjoys no special position under the applicable laws.

Two existing policies have resulted in the fundamental unsoundness of the methods being followed to meet the requirements of this Department of Defense traffic:

1. Instead of utilizing the air transport system established in accordance with Federal law, the Department of Defense operates its own airline, to such an extent that it has now reached the proportions which qualify it as the largest airline in the world. Thus, in addition to the very extensive airline system which has been established pursuant to law and in which both U.S.-flag and foreign-flag carriers are competitors, the Department of Defense has set up an additional carrier of enormous size, to add to the competition already authorized.

2. To the extent that the Department of Defense does utilize commercial aircraft for the movement of its traffic, it does so for the most part under a contract procurement system outside the regulatory scheme prescribed by Congress. The effect is to sponsor still another group of air transport operations in competition with the established airline system. While the Civil Aeronautics Act provides this complete regulatory scheme for airlines, this additional operation sponsored by the Department of Defense is conducted under destructive rate practices outside the regulatory scheme, as more fully set forth in the letter dated October 24, 1958, from the president of the Air Transport Association to the Chairman of the Civil Aeronautics Board, a copy of which is attached hereto for convenience of reference.

These two policies, which are not necessarily interrelated, are unsound since they:

1. Conflict with the intent, concept and underlying principles of the Civil Aeronautics Act, which place the responsibility of providing common carriage service between designated areas upon the certificated carriers.

2. Conflict with the President's civil air policy.

3. Prevent the most effective employment of our national air transport resources and development of the maximum airlift capacity to meet national emergency requirements.

4. Make no distinction between the supplemental and certificated carriers, thus permitting supplemental carriers to uneconomically duplicate, rather than supplement, the services of regularly certificated carriers.

5. Encourage destructive rate competition and unjust discrimination against the traveling and shipping public.

It is not surprising, therefore, that these policies of the Department of Defense have been criticized. Here are the words of some of the critics:

The Air Coordinating Committee:

"In determining the extent to which civil air transportation will be used in meeting military peacetime and wartime airlift requirements the Department of Defense should continue its policy not to engage in competition with private industry, and to support the expansion of the Nation's civil airlift capability on an economically sound basis." (Recommendation No. 3, p. 17, Civil Air Policy, May 1954.)

The House Appropriations Committee:

"the Government should to the greatest extent practicable, adjust the use of air transportation so as to use existing unutilized capacity of the United States air carriers." (Report, 1956).

The Senate Appropriations Committee:

"* * * that the Department of Defense should, in the future, utilize the services of commercial transportation to the fullest extent possible when it is more

[1] The Federal Aviation Act of 1958, effective Dec. 31, 1958, supersedes the Civil Aeronautics Act but continues in effect all the regulartory procedures and policies of the earlier act. Hence, after Dec. 31, 1958, all references herein to the Civil Aeronautics Act should be deemed references to the Federal Aviation Act.

economical, and that in evaluating relative costs of transportation, the Department of Defense should recognize the element of time saved as an important factor." (P. 8, Report, 1956.)

The Commission on Organization of the Executive Branch of the Government (Hoover Commission):

"That the peacetime operations of the integrated military air transport service be restricted and realistically limited to persons and cargo carefully evaluated as to necessity for military air transportation and, only after commercial carriers have been utilized to the maximum practicable extent, should transportation on service carriers be authorized." (P. 59, Report to Congress, 1955.)

The Senate Appropriation Committee:

"* * * we do not feel that sufficient effort has been made by the Department of Defense in the international and overseas field to adjust its use of air transportation so as to use existing unutilized capacities of the United States air carriers." (Report to 85th Cong.)

The House Appropriations Committee:

"* * * The Military Air Transport Service is the largest air transport service in the world. The committee questions whether this operation is not creating undue competition for private enterprise. On the other hand, the committee heartily endorses the necessity in peacetime for a hard-core, efficient, and immediately responsive Military Air Transport Service. The basic problem is the establishment of an equitable combination of military and civil capability.

"The committee feels that adequate arrangements can be developed by fair and objective cooperation to foster the growth of the civil fleet and at the same time maintain an effective Military Air Transport Service.

"The Military Air Transport Service should concentrate on outsize and special-cargo traffic and technical missions, leaving to the civil air carriers the primary responsibility for the transportation of passengers and the more conventional kinds of military cargo; * * * the applicable military directives and regulations should be redrafted to eliminate the preferential position of the Military Air Transport Service in peacetime military airlift and to establish, consistent with other recommendations in this report, a full partnership role for civil carriers in moving peacetime military traffic and in contributing to war readiness through the Civil Reserve Air Fleet." (Pp. 5 and 6, report, 1958.)

Senator Symington:

"If the people realize we have an airline set up commercially for the convenience and economy of our troops, with 480 stewardesses, and we yet cannot airlift more than a few regimental combat teams and support them in faraway places, they are going to want to have something done about it." (1959 defense appropriations hearings.)

Senator Monroney:

"We do not have in our MATS inventory the specific types of planes necessary for a logistical airlift, despite all the millions that have been spent to equip it. Instead, their planes parallel and duplicate the civilian air fleet which is flying with half-empty seats, while you are putting the load which the military is sending, which is the largest volume of traffic, largely on the MATS lines." (1959 defense appropriations hearings.)

The commercial carriers which have been receiving the impact of this Department of Defense competition have voiced similar criticism of the existing methods.

Despite these criticisms, MATS operations have increased vastly in recent years. In fiscal year 1954, MATS transported 384 million ton-miles of passengers and cargo. During the fiscal year 1957, 771 million ton-miles of service were provided. At the same time, the Department of Defense procurement practices arrived at outside the prescribed regulatory scheme have been greatly expanded and changed to a less, rather than a more, regulated system. Under these circumstances, it is timely that the Department of Defense has decided promptly to review the policies, and that the Civil Aeronautics Board is participating with the Department in this study. It is understood that the airlines will have an opportunity to present detailed recommendations for consideration as part of these studies. The following is a summary of the recommendations they will present:

1. It should be fundamental policy of the Department of Defense in programing its peacetime air traffic to place primary reliance on the scheduled services of the U.S.-flag certificated carriers, at rates approved by the Civil Aeronautics Board.

2. Unforeseeable requirements for air carriage on routes of or to areas served by the respective certificated carriers should be offered to those carriers at rates covered by their tariffs filed with the Civil Aeronautics Board

3. Traffic to areas or over routes not served by the respective certificated carriers, or exceeding the capacity of those carriers, should be offered to any U.S.-flag commercial airline found qualified and able to perform such service, at rates covered by its charter tariffs filed with the Civil Aeronautics Board.

4. Arrangements should be made between the Department of Defense and the air carriers for the provision of emergency military airlift commensurate with the traffic offered them pursuant to the above.

5. The size and makeup of the MATS fleet should be determined on the basis of estimated normal and emergency requirements in excess of those which can be met in the foregoing manner. What those requirements will be and how they can best be met are matters for determination by the Department of Defense and these recommendations are not intended in any way to suggest that the Department should not have complete authority and freedom of action in making those determinations. However, to the extent of its capability and availability the MATS fleet should be called upon first in emergency and, in the carriage of normal traffic, MATS should be limited to (a) that which cannot be accommodated pursuant to the above provisions, after the best efforts of all concerned; (b) that which cannot be physically accommodated on the commercial airlines due to unusual size or bulk; and (3) that which for security reasons, as determined by the National Security Council, must be confined to military aircraft.

6. The Department should use its large pool of traffic as a means of encouraging the airlines to invest their own capital in the acquisition of additional or different aircraft which would broaden the capabilities of the certificated air transport system, both for peacetime commerce and for national emergency. Such encouragement could take the form both of the above traffic policy, established in such manner that the airlines could reasonably rely thereon, and of consultation concerning aircraft types and configurations which would be valuable for both commercial and military purposes.

The following discussion of the underlying basis for the foregoing views and recommendations is divided into two parts. The first demonstrates that the recommendations stated above are based on sound policy. The second part shows, in a broad way, that these recommendations will meet the normal transportation and emergency airlift requirements of the Department of Defense, and meet these requirements better than the policies now being followed.

I

A. Requirements of the Civil Aeronautics Act

The Civil Aeronautics Act embodies a comprehensive regulatory scheme which has as its keystone the principle of regulated entry into the field. Section 401(a) of that act provides that no air transportation shall be conducted unless the carrier conducting it has a certificate of public convenience and necessity issued by the Board. The basic administrative tool provided for regulating competition is this power of the Civil Aeronautics Board to grant or deny economic operating authority in the form of a certificate of public convenience and necessity, to be issued only after public hearing.

Such authority may be issued only where it is demonstrated that the public convenience and necessity require the services of the carrier in question, and that the carrier is fit, willing and able to provide the service. Thus, the statutory test is not the private interest of the applicant but the public interest in the development and maintenance of a strong national air transportation system. To guide the Civil Aeronautics Board in administering its power, Congress in the Civil Aeronautics Act specified certain standards which are to be observed. In determining public convenience and necessity, Congress declared that the Board must, among other things, take into account the regulation of air transportation in such a manner as to assure the highest degree of safety in, and to foster sound economic conditions in, such air transportation, the promotion of adequate and economical service at reasonable charges without unfair or destructive competitive practices, and competition to the extent necessary to secure the sound development of an air transportation system properly adapted to the needs of commerce and the national defense.

Obviously, this system cannot grow and develop to meet these needs if some commercial operations are regulated and some are unregulated. It would ac-

complish nothing for the CAB carefully to weigh and determine what competition between certificated airlines is desirable in the public interest, if other similar operations, which divert millions of dollars of air traffic from them, are permitted to be carried on free from any control by that agency. Such a situation must, sooner or later, stultify the Civil Aeronautics Act.

B. The development of the airline system

The Civil Aeronautics Act sets out the guiding policies which are to underlie all of the economic decision of the Board. A primary principle is set out in section 2(a) of the act, as follows:

"The encouragement and development of an air transportation system properly adapted to the present and future needs of the foreign and domestic commerce of the United States, of the Postal Service and of the national defense."

Attached are copies of the international route maps of our certificated air transport system as it existed in 1938 and as it existed in 1957. These maps demonstrate the extent of the airline system developed under that legislation. There is now a quantum of service undreamed of at the time of the act's conception.

These maps do not include the routes of foreign carriers, which blanket the routes of the U.S.-flag carriers. For example, across the North Atlantic, the so-called blue ribbon route, there are three U.S. carriers competing with more than a dozen foreign-flag airlines.

In authorizing the international airline route system, the President and the Civil Aeronautics Board have been keenly aware of the statutory requirement that it be properly adapted to the needs of the national defense, as well as the commerce and postal service.

In June of 1945, in its decision certificating competitive services over the North Atlantic, the Board stated:

"The pattern of U.S. Air Transportation across the North Atlantic involved in the present proceeding must, in accordance with the Civil Aeronautics Act, be one best adapted to the present and future needs of the foreign and domestic commerce of the United States, of the Postal Service, and of the national defense. This pattern must not be limited by the prospects of the immediate future but must reflect the long-range future for air service. While it is true that additional service can be authorized in the future, we believe that we should now proceed as vigorously and as promptly as possible in the development of this comparatively new means of travel and trade."

In the Pacific case, decided in June of 1946, the Board discusses the importance of increases in traffic in the postwar period to the Orient and notes and rehabilitation requirements in the Far East, the community of interest with Alaska, particularly in terms of the U.S. Army, and other related factors as the principal points on which additional service was created across the Pacific and into the Orient.

More recently, in certificating Seaboard & Western Airlines, Inc., to engage in an all-cargo operation across the Atlantic to Western Europe, the Board cited the Department of Defense as a basis for its decision:

"* * * the Department of Defense has announced an unequivocal position 'favoring the establishment and expansion of civil air cargo service' across the Atlantic Ocean. In support of its position, its witness testified, inter alia, that: (1) the purchase and operation by the air transport industry of long-range aircraft in cargo configuration which can be converted expeditiously to military use is in the interest of the national defense; (2) international developments emphasize the need for transatlantic air cargo service; (3) present air cargo service provided by U.S.-flag lines is considered inadequate to meet military and civil requirements; (4) it is not considered that a well-developed transatlantic air cargo industry is in existence at this time; and (5) the Department of Defense has an existing requirement for additional air cargo service to Europe."

Furthermore, to the extent that this route structure involves competition between U.S.-flag carriers, competition must have been authorized in order to provide balanced competition. It was clearly intended by the Board and the President that the competition was created in the interest of economic operation and financial feasibility. Although the airlines are regulated public utilities, they are privately owned, and those with equity in airline companies are at least entitled to look forward to reasonable returns on their invested capital.

Accordingly, the potential traffic which was envisaged in the creation of a global civil air transport system was that which would come from the entire

reservoir of the American traveling and shipping public, including military and naval personnel and cargo, as well as other governmental personnel, who would be involved in the postwar travel renascence. The Government, having laid out a route structure in the interests of national defense and commerce, should use it.

C. Conflicting policies

With the basic policy as to air transportation established by Congress and a route structure to implement that policy established by the President and the Civil Aeronautics Board, the evolution in the Department of Defense of different policies results in endless conflict.

A high percentage of Government traffic is moved over the North Atlantic. In that area, three carriers are certificated—two combination carriers and one all-cargo carrier. In all of the decisions which resulted in the issuance of these certificates, national defense has been one element which justified the grant. The Department of Defense supported the issuance of all these certificates. These decisions were approved by the President.

A great deal of Government traffic moves over the Pacific. Again, three U.S.-flag carriers have been certificated to provide this service, including service to Hawaii. The Department of Defense has participated in many of the proceedings which resulted in certification.

Between the continental United States and Alaska, there are four certificated carriers. Within Alaska, there are nine certificated carriers.

A really remarkable conflict of policy exists. It would be expected that the Department of Defense would utilize, in the transportation of its own traffic, the carriers authorized to operate in its interest, and that it would channel its traffic in support of these carriers. Instead, the presence of these carriers is virtually ignored. Most of the Department of Defense traffic is moved on MATS airplanes; the rest, with very rare exceptions, is contracted under procedures contrary to and conflicting with the underlying principles of the regulatory scheme set forth in the Civil Aeronautics Act. In addition to the Department of Defense operating its own extensive air transport service side by side and in competition with the certificated carriers, it has assumed unjust and unwarranted privileges to the extent it uses commercial services. The Government does not permit any of its citizens or legal entities to engage in the practices which the Department of Defense uses in the procurement of its air transportation.

Surely, a certificate of public convenience and necessity was designed to mean something. The legislative history of the Civil Aeronautics Act makes it perfectly plain that the Department of Defense was intended to be one of the prime beneficiaries of the system of regulated competition established by the act. Regulated competition was designed to make strong, powerful, competent carriers who had the strength and ability to serve all of the traffic in normal times and to provide aid to the national defense in time of emergency.

There can be no doubt that, in past emergencies, the Department has been the beneficiary of the airline system built up under the regulatory scheme. It will be again. It should use that system to the maximum extent in normal times.[2]

D. Utilization of Department of Defense traffic for development of the air transport system

Millions of dollars of the Federal taxpayers' money went into the creation of the magnificent air transport system we have now. It was money well spent. The Government got what it sought to purchase.

The Government participated in the creation and development of this air transport system. For the Government not to foster it to the maximum extent with its own traffic is indeed ironic.

The general character of the certificated air transport system which is available to meet the Department of Defense needs for transportation in both peace and war is described above. It is made up of many competent people and excellent machines. It is a valuable asset to the Nation and to the Department of Defense. But it cannot, and should not, stand still. The operators of the system do not intend that it will. They propose constantly to build and develop that system, to improve their organizations and facilities, and to improve

[2] The achievements of the certificated airline system during World War II, the Berlin airlift, and the Korean airlift are well known and need not be set forth here.

the equipment with which they operate. As they do so, they increase the value of the Department of Defense national defense asset.

One of the things that permits the airlines to develop rapidly and effectively is increasing volume of traffic. The process is an obvious one. The airlines, just like any business enterprise, need business to expand. The more buiness they get, the sounder is their operation, and the more they are able to improve their service.

The Department of Defense has in its hands well over a billion ton-miles of international and overseas air traffic each year. That is more than the total of all the traffic carried overseas by the U.S. certificated airlines.

The Department of Defense and Civil Aeronautics Board should look at this traffic as a potential means of strengthening and developing the civil air transport system as a larger and more modern defense asset.

This will call for a reversal of the present policies which result in operations outside the regulatory scheme established by law to develop this national asset.

E. Department of Defense procurement practices inconsistent with the regulatory scheme of the Civil Aeronautics Act

The Civil Aeronautics Act was adopted following a history of competitive bidding for airmail contracts which threatened to wreck the industry. In the light of that experience it was evident that a proper air transportation system could not exist and develop if such practices were permitted. Accordingly, the Congress adopted a complete regulatory scheme for air transportation.

The fundamental feature of this regulatory scheme, as pointed out above, is the requirement that a carrier have authorization in the form of a certificate of public convenience and necessity issued by the Board. One of the other important features of the regulatory scheme is the requirement for the filing of tariffs which establish rates published in advance and available to all who come within their terms. However, the Department of Defense, which is required by law to utilize competitive bidding in connection with the usual type of procurement from suppliers in unregulated industries, has insisted on following this same practice in the procurement of commercial air transportation. This is inconsistent with the regulatory scheme of the Civil Aeronautics Act. It is only because the Civil Aeronautics Board has been induced to waive the statutory requirements, first, with respect to operating authority, and second, with respect to filing of tariffs, that the existing practices sponsored by the Department of Defense have been possible at all. No law requires the Department of Defense to seek such waivers. On the contrary, they are inconsistent with the philosophy and purpose of the existing law and are basically unsound.

II

The previous section has dealt with the underlying reasons why the Department of Defense should primarily rely upon the services of the certificated airlines instead of utilizing MATS services or the services of any operator who files the low bid in connection with a particular contract. Section II shows, in a broad way, that the Department can meet its air transportation requirements through use of commercial airlines and that these requirements will be better served in this fashion.

A. Scope of the service available

The attached 1957 route map referred to above shows the system of international and overseas routes certificated by the Board. This system consists of 13 international and overseas airlines, 3 all-cargo airlines, and 8 Alaskan airlines. These carriers serve 152 foreign cities in addition to various U.S. continental, Territorial, and Alaskan points. These routes serve the areas between which most of the Defense Department traffic moves.

During 1957 this system moved 2,432,000 international passengers originating in the United States. It produced over 5.7 billion passenger-miles, 57 million mail ton-miles, and 123 million cargo ton-miles of service in 1957. Taken in the aggregate, the aircraft of these airlines comprise the largest and finest international fleet in the world. Moreover, this fleet is now in the process of being

further modernized with additional turbine-powered aircraft.[3] The extent to which these plans are carried out and expanded depends in no small measure upon how Department of Defense traffic is moved. Existing policies can severely hamper the development. Those recommended here will encourage it.

For the year ending August 31, 1958, this system was operating at an average load factor of 60.58 percent. Thus, there was available within the system great unused capacity. In October 1958, the first jets went into service on a U.S.-flag airline. With these aircraft, the capacity of the airline system will be greatly increased month by month. It will be necessary for a large amount of serviceable and modern piston engine equipment to be sold by the airlines, and the furloughing of some of the crews which have been operating this equipment has already started. Again, the extent depends upon how Department of Defense traffic is handled.

The capacity of this system is indeed impressive. It is providing an excellent public service for millions of passengers and tons of mail and cargo. Most of the Department of Defense traffic could be moved in this same fashion. Department of Defense traffic in general has no special characteristics, and therefore requires no special service. There is no reason why that traffic cannot be handled adequately and efficiently, since many shippers of a large volume have been able to rely on the airlines, and millions of passengers have found that the airline service meets their requirements.

The above discussion of the system and its capacity is a broad-scale treatment; and, in order to determine precisely how Department of Defense traffic requirements can be met, it will be necessary to analyze the requirements with respect to specific routes at specific times. The airlines concerned are prepared to do this in cooperation with traffic management experts of the Department of Defense. Such cooperation could follow the suggestion of the report of the House Government Operations Committee, which suggests the framework for such airline-Air Force cooperative action in its recommendation No. 15: "The Air Force should establish for the Military Air Transport Service a transportation advisory committee broadly representative of the civil air industry and organized so as to provide for periodic and special consultation."

B. Price

The Government is entitled to get its transportation at a fair price. However, the Department of Defense is not entitled to unjustly discriminatory prices which are expressly prohibited by the Civil Aeronautics Act, and the Department of Defense should not use its overwhelming bargaining strength to force upon the carriers rates which are uneconomic and destructive.

The foregoing is not meant to indicate that it is necessarily inappropriate for the Government to have available rates which are different from those available to the public generally, if the facts and circumstances relating to Government transportation justify lower rates. The individual certificated airlines are prepared to review these facts and circumstances and, in conjunction with the Department of Defense, to determine what the proper rates should be, subject to the regulatory powers of the Civil Aeronautics Board.

C. Advantages to the Department of Defense

The use of the services of the certificated airlines will result in many direct advantages to the Department of Defense.

The scheduled services are provided at a high standard designed to meet the requirements of the entire traveling public. Competition, including the competition of foreign-flag carriers, encourages this standard. Increased use of the services provides the carriers with the revenues with which to keep it up. Under the present system, the Department of Defense must maintain constant surveillance over the standards of service, and must expend considerable money and effort to insure that they do not fall below an acceptable level. This is unnecessary when certificated scheduled service is used.

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[3] The economic significance of the U.S. scheduled airlines' investment in turbine-powered aircraft was pointed out by General Quesada's recent report to the President, which was prepared by Dr. Paul W. Cherington. The report stated: "The airline investment program * * * is important to the economy as a major private investment program. It is estimated that the program directly involves an average of 80,000 to 125,000 net additional jobs annually in the economy and indirectly still more." The report further noted: "Thus, the success or failure of the present investment program is inevitably of concern to the Government." In transmitting the report to the President, General Quesada wrote: "This substantial investment of private capital is a dynamic element of our national economy which should not falter."

The certificated scheduled airlines maintain throughout the world an extensive organization with facilities, long-range aircraft and trained crews, skilled ground personnel, communications networks, and millions of dollars worth of owned and leased buildings and facilities. These are available to serve the Department of Defense in normal times and to meet emergency requirements. The CRAF program has been developed to make the aircraft, personnel, and facilities available in a speedy and efficient manner in emergency. It is obviously an advantage to the Department of Defense to build up the civil airlines in order to improve the facilities which will become available under such circumstances. Furthermore, the airlines are prepared to discuss plans under which equipment, personnel, and facilities can be made available for lesser emergencies than those which may bring the CRAF program into operation. The amount of equipment to be made available under such circumstances can be geared to the amount of utilization of the service by the Department of Defense during normal times.

Finally, it must be recognized that increased use of the services of the certificated airlines will bring about an expansion of their fleets through acquisition of more of the most modern aircraft. The present Department of Defense system of procurement encourages the use of aircraft with minimum acceptable standards. The best method of insuring the maximum amount of efficient lift for emergency is to provide maximum support to the certificated scheduled airlines in normal times.

AIR TRANSPORT ASSOCIATION,
Washington, D.C., October 24, 1958.

Hon. JAMES R. DURFEE,
Chairman, Civil Aeronautics Board,
Washington, D.C.

DEAR MR. CHAIRMAN: We have noted in order E–13040, dated September 30, 1958, that the Civil Aeronautics Board and the Department of Defense are immediately undertaking joint study of the problem of the role of the civil air carriers in the movement of military traffic and that, in connection with that study, carrier views on the subject will be considered. Accordingly, the Air Transport Association would like to submit the following preliminary comments.

The first point we wish to emphasize is that the great bulk of the Defense Department traffic available for commercial carriage does not differ fundamentally from any other class of traffic carried on the regularly scheduled services of the airlines, nor does it occupy any special status under the act which the Board administers. No carriers except those certificated for the route have any inherent authorization to carry this traffic, and not even the carriers certificated for the route have any inherent right to be relieved of the tariff requirements of the act.

Only when the Board authorizes a departure from the underlying provisions of the act, in the form of valid exemption orders, is any other air carrier entitled to carry this traffic, and only with such exemptions is any carrier relieved of the tariff requirements. Under the law, the Board has complete authority to regulate the commercial air services used by the Department of Defense, and the Board is the sole judge when there is any request for a departure by way of exemption from the basic provisions of the act. Finally, the Board's duty, under the policy declaration of the act, is to provide for the development of an air transport system properly adapted to the foreign commerce of the United States, the postal service, and the national defense.

The second fundamental is that the certificates which establish the route system for scheduled oversea and foreign air transportation by U.S.-flag carriers are issued only by direction of the President after hearing and argument before, and recommendation by, the Civil Aeronautics Board. In granting certification, the Board takes into consideration the economic aspects of the proposed service and the desired degree of competition, while, both the Board and the President consider the prospective effects on foreign policy and the national defense. The carriers which receive such certification for regular scheduled service commit large amounts of stockholders' capital to the operation of the routes authorized. They are obliged to provide service throughout the whole term of their authorization, in heavy and light traffic seasons, on unprofitable as well as profitable sectors, under favorable and unfavorable economic conditions, and (as to foreign air transportation) all of this in the face of large-scale foreign-flag competition.

We have stated these two fundamentals because the recent order of the Board, referred to above, tends to obscure them. We are particularly concerned that, at one point in the order, the Board went so far as to suggest that certificated carriers allegedly possessed an economic advantage as compared with those who are not certificated, thus intimating that the latter class of carriers not only has an equal right to the business but might even deserve some special protection in obtaining it. Any such view would seem to us to be an utter misconception of the Board's statutory duty to support and strengthen the U.S.-flag air transport system which is created through the certification process provided for in the act.

It is ATA's position that the Board should not, through the exemption process, permit the continuance of a duplicate air transport system (as to which the Board has heretofore substantially waived its powers of regulation) paralleling the certificated system of regular, scheduled service for the purpose of accommodating Defense Department traffic, traffic which requires no such special treatment. Particularly should the Board not do this when it adversely affects the scheduled services of the airlines which have dedicated their capital pursuant to certificates authorized by the Board and the President. It is our position, on the contrary, that Defense Department traffic, like all other Government traffic, should, in the absence of special circumstances, move on the regular schedules of the certificated airlines, thus strengthening the air transport system which has been certificated to serve the Nation's commerce and national defense.

We are pleased to see that the Board intends to hear carrier views in connection with the studies which will be conducted jointly with the Department of Defense. We hope, accordingly, that the Board will promptly prepare a proposed policy consistent with the foregoing and receive comments thereon, in order that the joint studies may be brought to a close and a policy established in the very near future consistent with the underlying purposes and requirements of the Federal Aviation Act.

These comments are made pursuant to the determination of the board of directors of the association, with one director (Mr. Prescott) dissenting, of the association's policy regarding the transportation of military traffic.

Very truly yours,

S. G. TIPTON.

AIR TRANSPORT ASSOCIATION OF AMERICA,
Washington, D.C., December 31, 1958.

Hon. PERKINS MCGUIRE,
Assistant Secretary of Defense (Supply and Logistics),
Department of Defense, Washington, D.C.

DEAR MR. MCGUIRE: This supplements my letter to you dated November 20, 1958, which deals with the movement of Department of Defense traffic on the scheduled certificated airlines. In the second part of the attachment to that letter we dealt with the question as to whether certificated scheduled service could meet the requirements of the Department of Defense. We were necessarily required to deal with this problem in somewhat general terms. In order to identify more specifically the arguments which might be used to demonstrate that certificated scheduled service would not be adequate, and to determine whether there were solutions to the problems which were thus raised, we appointed a working group of experienced airline operating men to study these problems. The working group met with MATS representatives at Scott Field and continued their studies at two APOE's, Dover AFB and McGuire AFB. The working group received excellent cooperation from MATS headquarters at Scott Field. As a result of this careful exploration we are convinced that a very high percentage of Department of Defense traffic now being handled either by MATS or under contract can be handled more conveniently or more efficiently by the certificated scheduled airlines.

The major operational reasons which are urged against the use of scheduled certificated service are as follows:

1. In the normal course of business, the scheduled certificated airlines do not serve aerial ports of embarkation.

2. These airlines could not meet the requirements of the Department of Defense during peak periods.

3. The MATS priority system could not be used if the scheduled certificated airlines were employed.

4. Certain Department of Defense cargo traffic could not be moved with equipment now being operated by the certificated scheduled airlines.

5. MATS would lose managerial control of cargo traffic.

There follows our analyses of these five points of objection, set forth in the order above named.

I. AERIAL PORTS OF EMBARKATION

Ports of embarkation serve useful purposes and are probably necessary with respect to surface movement. However, the aircraft is a much more flexible vehicle and is unrestricted by land and sea boundaries. Moreover, there is no need to accumulate traffic for large boatload lots when an airplane is to be used. We believe that most DOD traffic need not be routed through an APOE.

Since little or no traffic actually originates at the APOE's the traffic is routed there for other reasons.

On reason given for such routing of traffic is the problem of processing personnel for shots, documentation, etc., at staging areas generally located near APOE's. The practices of the three services, however, are not uniform in this regard, and in fact they have made substantial progress toward eliminating any requirement for the staging of personnel. For instance no Air Force personnel moving overseas by air have to pass through a staging area. In the case of the Army, personnel on a temporary duty status do not have to go through the staging area.

Those personnel not required to go through the staging area would find it much more convenient to be routed directly from their actual departure point within the United States via certificated scheduled services with through reservations and convenient connections to their ultimate oversea destination. With rare exception the commercial gateway is more accessible than an APOE and the through routing would reduce to a substantial degree the baggage handling and transfer problems both within the United States and overseas. Such a routing would tend to speed up the movement of traffic since routing through a staging area almost invaribly means a backlog and resulting delays.

With respect to those personnel still required to go through a staging area, they can be routed from the staging area to the commercial gateway just as easily as they are routed from the staging area to the APOE. This is proven by the fact that some commercial contract flights under the direction of MATS now originate at Idlewild rather than McGuire AFB. The staging area is very accessible to the commercial gateway. For example, Fort Hamilton in New York is a large staging area. The distance from Fort Hamilton to Idlewild is only 8 miles whereas the distance from Fort Hamilton to McGuire is 79 miles.

Another reason which might be given for routing through the APOE's is the problem of handling privately owned vehicles belonging to personnel overseas in a permanent change of station status. This presents no problem since it can be handled at the commercial gateway or in the downtown area near the commercial gateway. In the case of personnel moving in the Pacific area we understand the automobiles are handled in downtown San Francisco at the present time even though the passenger is departing from Travis AFB.

One reason that cargo traffic has been routed to the APOE's is the strip tare program. MATS estimates that 50 percent of the cargo traffic arriving at the APOE's by surface transportation goes through strip tare. From observations of the working group at the APOE's it would appear that this estimate is considerably higher than actual experience. It would probably not exceed 25 percent. In addition, it is possible that the strip tare program is being overemphasized. Our working group found that the program is applicable only to Air Force cargo. It does not apply to other Department of Defense cargo. It is this difference in treatment which raises a question in our minds. If the strip tare program is necessary in the interest of economical movement of Air Force cargo it should be applied to all Department of Defense cargo. If it is not necessary to the economical movement of Army and Navy cargo, it probably is not necessary for cargo shipped by the Air Force.

Whatever may be the necessity for the strip tare program under present methods of moving Department of Defense cargo, the problem is created by packaging the shipments for surface movement to the APOE's. The necessity for repacking for air movement can be eliminated by packing the shipment suitably for such movement and routing the cargo by air from origin to ultimate destination.

It may be claimed that routing via common carriage air transportation would require trucking and is therefore not feasible. While the requirement would undoubtedly exist, we cannot agree with the conclusion, since very little commercial air cargo originates at airports. Trucking for distances up to 100 miles is a routine everyday operation. Whether Department of Defense cargo is airlifted by MATS, LOGAIR, contract carrier, or common carriage, trucking is generally required at one or more points. In this connection, it should be noted that the handling necessary between a depot warehouse and the local civil air terminal is not necessarily greater than the handling necessary between the same warehouse and a military air terminal.

The handling techniques developed for the surface movement of commercial air cargo now work so well that many shippers pay higher transportation rates for items ranging from delicate instruments, electronics equipment, and precision tools, to baby chicks, flowers, livestock, etc. They have found these higher transportation costs are more than offset by savings in packaging costs, movement of extra tare weight, and much less damage to the cargo, in addition to the very substantial savings resulting from reduced inventories in the pipeline, an advantage well recognized by the Air Force with their jet engine airlift program. We believe similar benefits can accrue to the military whenever commercial services are used.

Another stated reason for routing through APOE's is the consolidation of shipments weighing 20 pounds or less. This consolidation could be effected at commercial gateways in a manner similar to that now performed at the APOE's. This type of traffic, however, is substantially diminishing due to the use of air parcel post for movement of small items (up to 20 pounds) direct from the depot or vendor to the user.

This whole discussion of aerial ports of embarkation raises the question as to whether the elaborate and extensive facilities there are really necessary if scheduled common carriage were used to the maximum extent. If scheduled common carriage were used to move passengers and cargo from origin to ultimate destination, utilizing the existing facilities which are associated with that service, passenger and cargo traffic at APOE's would be drastically reduced, permitting a corresponding reduction in facilities there. There would be little need for the maintenance at APOE's of facilities such as hotels, restaurants, banks, buses, barber shops, PX's, warehouses, materiels handling systems, trucks, and other similar equipment. It is impossible for us to make the detailed studies necessary to determine the cost saving which would thus be associated with the use of scheduled common carriage. It does appear, however, that substantial question having been raised as to the need for these elaborate facilities, a study by the Department of Defense of these savings would be fully justified.

There are now two situations which lead us to this conclusion. First, much of the mutual defense assistance program traffic is now being routed on a common carriage basis from origin to destination. Second, 10 to 12 percent of the cargo arriving at the APOE's moves through the LOGAIR system from its point of origin, and therefore, is packed for air shipment at its point of origin. This traffic could, without question be routed directly to commercial gateways and flow expeditiously.

II. RESPONSIVENESS DURING PEAK PERIODS

It is believed by some within the Defense Department that there would be a lack of responsiveness by scheduled common carriers during certain peak seasons, particularly the transatlantic tourist season. This belief springs from the misconception that if commercial transportation is to be used to meet Department of Defense traffic requirements, fixed requirement and call type contracts must be used. This became abundantly clear during the first quarter of this fiscal year, the time of the Lebanon crisis. At that time the U.S. scheduled certificated carriers operated eastbound at a 53 percent transatlantic load factor whereas MATS (and others in the DOD) publicly stated that, "As a matter of fact, we (MATS) actually drained the commercial airline resources during this operation." The fact is that 47 percent, or over 57,000 seats, of our transatlantic capacity was unused but it was not considered an available means of moving Department of Defense traffic.

The U.S. scheduled certificated airlines have steadily increased their capacity to meet the needs of commerce and trade, the traveling and shipping public, and the Government itself, including the postal service. Between 1952 and 1957 these airlines have almost doubled their available capacity.

There follow two tables which provide a comparison between movement of commercial and MATS transatlantic passenger traffic for a 2-year period:

TABLE I.—*Seasonality of transatlantic passenger traffic* [1]

Calendar years, quarters	U.S. scheduled certificated carriers		MATS		U.S. scheduled certificated carriers and MATS combined	
	Passengers	Percent of variation from average quarter	Passengers	Percent of variation from average quarter	Passengers	Percent of variation from average quarter
1956:						
1st quarter	56,730	−37	52,955	−10	109,694	−27
2d quarter	96,252	+6	60,760	+3	157,012	+5
3d quarter	133,462	+47	68,652	+16	202,114	+35
4th quarter	76,249	−16	54,056	−9	130,305	−13
Average quarter	90,676	0	59,106	0	149,782	0
1957:						
1st quarter	64,787	−37	50,220	−8	115,007	−27
2d quarter	114,215	+11	51,550	−5	165,765	+5
3d quarter	149,310	+45	59,423	+9	208,733	+32
4th quarter	84,103	−18	56,664	+4	140,767	−11
Average quarter	103,104	0	54,464	0	157,568	0

[1] MATS traffic refers to channel traffic carried by MATS military aircraft.

TABLE II.—*Directional imbalance of transatlantic passenger traffic* [1]

Calendar years, quarters	U.S. scheduled certificated carriers			MATS			U.S. scheduled certificated carriers and MATS combined		
	Peak dir.	Off dir.	Percent off of peak dir.	Peak dir.	Off dir.	Percent off of peak dir.	Peak dir.	Off dir.	Percent off of peak dir.
1956:									
1st quarter	[2] 28,456	[3] 28,283	99	[3] 26,972	[2] 25,983	96	[3] 55,255	[2] 54,439	99
2d quarter	[2] 48,444	[3] 37,808	65	[3] 31,279	[2] 29,481	94	[2] 77,925	[3] 69,087	89
3d quarter	[3] 82,893	[2] 50,569	61	[3] 35,313	[3] 33,339	94	[3] 118,206	[2] 83,908	71
4th quarter	[3] 47,991	[2] 28,258	59	[2] 28,101	[2] 25,955	92	[3] 73,946	[2] 56,359	76
1957:									
1st quarter	[3] 36,600	[2] 28,187	77	[3] 25,359	[2] 24,861	98	[3] 61,959	[2] 53,048	86
2d quarter	[2] 62,042	[3] 52,173	84	[3] 26,856	[2] 24,694	92	[2] 86,736	[3] 79,029	91
3d quarter	[3] 89,720	[2] 59,590	66	[3] 31,175	[2] 28,248	78	[3] 120,895	[2] 87,838	73
4th quarter	[3] 53,189	[2] 30,914	58	[3] 30,223	[2] 26,441	87	[3] 83,412	[2] 57,355	69
Total 8 quarters	449,335	315,782	69	235,278	219,002	93	678,334	541,063	80

[1] MATS traffic refers to channel traffic carried by MATS military aircraft. [2] Eastbound. [3] Westbound.

As is shown by the two tables, the MATS traffic is not nearly as difficult for the scheduled certificated carriers to handle as is the traffic they are now handling. In the first place, MATS traffic does not peak as severely as the traffic of the scheduled certificated carriers. The maximum peak in MATS traffic amounts to 16 percent over the norm whereas the maximum peak in commercial traffic was 47 percent over the norm. Table I also indicates that if MATS traffic were combined with and handled by the scheduled certificated carriers, the maximum peak for the scheduled certificated carriers would be reduced to 35 percent over the norm. As shown by table II, MATS traffic is not nearly as imbalanced directionally as is the traffic now carried by the scheduled certificated carriers. If MATS traffic were combined with and handled by the scheduled certificated carriers, there would be significantly greater directional balance in the traffic carried.

On the basis of the figures presented, there would seem to be little doubt that if a definite policy were established of utilizing common carriage service, the carriers could meet the requirements of the Defense Department. As a matter of fact, their situation would be decidely improved since, as the above figures show, during half of the quarters set forth in the tables the directional imbalance in MATS traffic is opposite to that now handled by scheduled certificated carriers. Thus, MATS traffic would utilize empty capacity now being operated by reason of commercial traffic imbalance. In addition, the problem of seasonal peaks would be lessened if the scheduled certificated carriers handled MATS traffic.

With specific reference to cargo traffic, the existing common carriage capability has been responsive to sizable peaks, and frequently on short notice. Common carriage is responsive on a day-to-day basis to prevent the accumulation of excessive backlogs which cause some of the peak loads. In addition, had the Department of Defense placed primary reliance upon common carriage the scheduled cargo capacity would be much greater today than it is.

For both passenger and cargo traffic individual common carriage movements can be purchased without time-consuming contractual arrangements, which in turn allows the movement in accordance with the day-to-day flow of traffic without requiring the DOD to pay for unused space as on the contract operation including returning empty.

III. PRIORITY SYSTEM

General speaking, a priority system is only required to get the most important traffic through an unforeseen bottleneck, or a deliberately created backlog. MATS has established as normal a working cargo backlog of 3 days capacity. The certificated common carriage method with its greater frequency of service and capacity operates without any planned backlog and hence eliminates the need for any priority system except in the rare cases when an unforeseen backlog develops. In those cases a choice could be made betwene two or more Department of Defense shipments. The carriers have supervisory personnel at the gateways capable of making a proper selection in accordance with whatever rules and principles may be established by the DOD.

IV. LIMITATIONS ON THE SIZE AND TYPE OF CARGO TRAFFIC WHICH CAN BE MOVED BY COMMON CARRIAGE

According to statements of MATS personnel 30 percent of the DOD cargo cannot be moved by common carriage because of size or weight or for security reasons. This means, therefore, that 70 percent of the Department of Defense shipments can be accommodated on the types of aircraft in the existing commercial fleet. By a review of packaging techniques, possible some of the outsize shipments could be reduced, i.e. made eligible for movement on existing commercial aircraft. The cargo which cannot be offered for common carriage due to security reasons is relatively small and amounts to about 1 or 2 percent of the total volume. It is clearly evident that the vast majority of Department of Defense cargo can be accommodated by aircraft now in the civil fleet.

The fact that the present commercial fleet does not possess aircraft capable of physically accommodating what is currently considered outside cargo, evidences the point that existing Department of Defense policies should be revised to encourage the development of a civil air transport system designed to more fully meet the needs of national defense.

V. MANAGERIAL CONTROL OF CARGO TRAFFIC

The managerial control of cargo is exercised by military air traffic coordinating officers. Their job is to regulate the flow of traffic so that the shipments arrive at their destination when needed and, at the same time, do not overload either the APOE's or the transportation capacity available. They are regulators of the movement of traffic. MATS has expressed concern that if traffic is moved by certificated scheduled service this managerial control will be lost or substantially impaired.

The managerial control exercised by the air traffic coordinating officers is the same managerial control customarily exercised by industrial traffic managers in industry. The use of scheduled common carriers does not impair their ability to manage the flow of their traffic, and it seems clear to us that the use of such service by the Defense Department would not impair their control. As a matter of fact, if reliance were to be placed upon the scheduled common carrier system, it would greatly increase the flexibility available to the air traffic coordinating officers. More routings, more carriers, and more capacity would be available to them. The Department of Defense does not lose control of its traffic when it uses railroads, trucks, busses, or over-ocean shipping. There is no reason to believe that traffic management would be impaired by the utilization of common carriers by air. As a matter of fact, the country is full of satisfied air shippers including the Department of Defense.

In this brief report I have attempted to give you some of the reasons why we are convinced the certificated scheduled airlines can do a better and more extensive job for the Department of Defense than we are doing now, and why we are sure it is feasible for the Department to place primary reliance upon us rather than upon MATS for overseas and international movements. In the event you disagree with any conclusions stated herein, either because of a disagreement with the facts upon which our conclusions are based or for military reasons not known to us, I would deeply appreciate being so advised.

Sincerely yours.

S. G. TIPTON.

AIR TRANSPORT ASSOCIATION,
Washington, D.C., March 27, 1959.

Hon. PERKINS MCGUIRE,
Assistant Secretary of Defense (Supply and Logistics),
Department of Defense, Washington, D.C.

DEAR MR. MCGUIRE: Reference is made to my letters of November 20, 1958, and December 31, 1958, in connection with the air movement of Department of Defense international and overseas traffic. In the first of these letters we argued the general policy question as to the air movement of this traffic. We took the position that the Department of Defense should not maintain an airline system separate from that established under the Federal Aviation Act, but should rely primarily for the movement of its traffic upon the regularly scheduled and supplemental air carriers, each operating in its appropriate sphere.

In the letter of December 31, 1958, we reported results of a detailed study as to the feasibility of this method of moving Defense Department traffic, and concluded that the requirements of the Department of Defense could be met more efficiently by the regularly scheduled and supplemental carriers than through the operation of a Government airline as now provided. We have invited the Department's analysis and criticism of the policies advocated and the operating recommendations made.

While such analysis and criticism has not been forthcoming, we have, nevertheless, continued our studies. Almost anyone considering our recommendations and comments would inquire as to the effect of the changes of policy and operating practice upon the cost of moving Defense Department air traffic. We have studied that subject and are now reporting to you the results of these studies.

It appears that if the policies advocated by us in our previous correspondence were adopted by the Department of Defense, the traffic involved could be moved at current commercial rates with a clearly identifiable saving to the DOD of $94.8 million annually. At the same time, the aggregate emergency capability of MATS and the civil carriers would be improved.

These savings are predicated upon a phased reduction in the MATS average fleet utilization from 6 to 1½ hours per day per aircraft, and a commensurate reduction in MATS personnel and other military expenditures. The Department

of Defense overseas and international air traffic released by this reduction would be transported by regularly scheduled and supplemental air carriers, each operating in its appropriate sphere. As is set forth in attachment A, this action would reduce annual expenditures for MATS, based upon the fiscal year 1960 budget, in the amount of $551.8 million.

The budget for fiscal year 1960 estimates the total Defense Department common user airlift service (i.e., the requirement to be met by MATS) to be 1,016 million ton-miles of cargo and mail and 403 million ton-miles of passenger traffic. We estimate the cost to the Department of Defense of moving 75 percent of this traffic commercially to be $457 million, as detailed in attachment B.

Necessarily, the validity of this potential saving depends upon the effect of the reduction in MATS fleet utilization upon emergency airlift capability. This effect must be examined from two standpoints—the ability to meet initial and/or short-term emergency airlift requirements, and the ability to sustain an emergency airlift over a substantial period of time. In the case of the requirement first mentioned, the MATS fleet would be more readily available and responsive to meet current emergency requirements than is the present case. As has often been pointed out, one of the real difficulties encountered by the MATS fleet in achieving instantaneous responsiveness has been the utilization of a large part of that fleet in a scheduled airline operation, which necessarily results in the fleet being scattered all over the world. The consolidation of that fleet for an emergency airlift task would take a substantial period of time. With the proposed decreased utilization, it would be far easier for MATS to develop plans for meeting its emergency responsibility than is now the case. It is our understanding that the MATS heavy troop carrier units are operated and manned for approximately a 1½-hour utilization rate, and that these units are considered capable of meeting initial and/or short-term emergency airlift requirements. This fact was evidenced by the participation of these units in the recent deployment of military forces to Lebanon and Formosa. Thus, it appears that from the standpoint of immediate responsiveness, MATS would be a greater asset to the national defense under our proposed program than it is now.

As to the ability to maintain an emergency airlift over a substantial period, it seems likely that a reduction in MATS utilization of the magnitude here proposed would detract from its ability to sustain an airlift over a considerable period of time, but that deficiency would be replaced by the civil airlines which carry the Defense Department's peacetime traffic released by the reduction in the MATS utilization rate. The amount of this civil emergency airlift would be related and in proportion to the amount of peacetime Defense Department traffic carried by the airlines. Presumably the Department of Defense would conduct periodic test exercises to insure the readiness of the civil air carriers to fulfill their emergency roles.

In order to assure an orderly transition, the reduction in MATS utilization should be phased over the next 3 fiscal years. Thus, the average annual MATS utilization rate should be phased from its present level of 6 hours per day per aircraft to 4.5 hours in fiscal year 1960, 3 hours in fiscal year 1961, and 1.5 hours in fiscal year 1962. The program outlined above would make operating funds available on the planned phased basis, in addition to the capital funds which would be saved in fiscal year 1960 and thereafter. The amount of emergency airlift to be provided by the airlines would also be on the planned phased basis.

The effect of our program upon Government expenditures is not complete without reference to the effect of adding to the traffic now carried by the civil airlines the additional traffic which would be released by MATS. The maintenance of a strong and effective air transport system is required by the national interest. The Congress has so determined, and the Government is dedicated to the accomplishment of this objective even though Federal financial aid may be required. The financial effect of the addition of the Defense Department traffic would, in all likelihood, eliminate subsidies presently being paid to international and oversea carriers, and would contribute to those carriers not being subsidized the financial strength to conduct the necessary operations and develop their systems in the face of strong subsidized foreign competition. It would also increase their ability to finance the purchase of additional modern turbine-powered transport aircraft. Thus, service to the Department of Defense in normal times would be improved and available emergency airlift would be created without Government expenditures for corresponding aircraft. Before long we will present a more detailed study as to the effect of this traffic on the financial

soundness and development capacity of our international and oversea systems.

At the present time our Government is making every effort to save every possible dollar in defense and other expenditures, in order to balance the current and future budgets. For all of the reasons that have been publicly stated, this is regarded as a matter of the highest national interest. It does appear, therefore, that a proposal such as this, which can have the effect of saving almost $95 million annually while strengthening the defense posture of the country should be given serious consideration.

Cordially,

S. G. TIPTON.

ATTACHMENT A

Estimate of Defense Department funds which could be reprogramed and used annually for the procurement of international and oversea air transportation [1]

	Millions
Potential sources:	
1. Reduced procurement of jet transport aircraft for MATS	$66.0
2. Reduced military construction	18.0
3. Reduced procurement of capital equipment other than aircraft	62.5
4. Reduction in those MATS costs that are industrially funded other than commercial augmentation	156.6
5. Reduction in EASTAF and WESTAF military pay allowances	150.5
6. Reduced medical support costs for EASTAF and WESTAF military and dependent personnel	5.1
7. Reduced training support costs (other than training performed by and within MATS)	13.1
Subtotal	471.8
Existing source:	
8. Commercial contract augmentation to MATS	80.0
Total	551.8

[1] See notes for computing bases.

Notes for computing bases

	Millions
Reduced procurement of jet transport aircraft: It is our understanding that the Air Force procurement budget for fiscal year 1960 includes an item amounting to $66 million for jet transports for the MATS fleet. In this connection, the scheduled certificated U.S. airlines have over $2.5 billion worth of the most modern jet powered transport aircraft on order. These aircraft have been privately financed. Others needed to carry additional Defense Department traffic can also be financed at no cost to the taxpayers. Obviously this would be an annually recurring item if present policies are to be followed. If the MATS fleet is to be modernized by the addition of aircraft of this type, capital expenditures of at least this magnitude would be required	$66.0
Reduced military construction: Since figures are not currently available for MATS fiscal year 1960 construction, of necessity we predicated this estimate upon the military construction appropriations bill, 1959. This bill provided $12,433,000 for MATS oversea construction and $10,634,000 for construction in the continental United States, or a total of $23,067,000. For purposes of estimates an arbitrary 20-percent reduction was applied to the $23 million recognizing that some of the $23 million was for support of the technical services provided by MATS and not necessarily directly related to MATS air transport activities	18.0
Reduced procurement of capital equipment other than aircraft: This item includes that equipment procured by the Air Materiel Command for support of MATS transport activities, and appears under the Air Force logistical support program in the President's budget. Equipment such as spare engines, engine parts, airframe spares, electronics and communications equipment, and ground handling equipment are included. The cost of MATS aircraft in the MATS transport fleet was estimated to be $1,250 million by General Tunner in testimony before the Subcommittee on Military Operations of the House Committee on Government Operations. The cost of capital equipment to support this fleet is estimated to approximate 5 percent annually, and hence $62.5 million ($1,250 million times 5 percent)	62.5

Notes for computing bases—Continued

Millions

Reduction in those MATS costs that are industrially funded other than commercial contract augmentation: As set forth on page 528 of the President's budget for fiscal year 1960, the total airlift service industrial fund amounts to $288.8 million. This figure, however, includes the estimated $80 million for commercial augmentation. Therefore, an estimated $208.8 ($288.8 minus $80) million would be available to fund those MATS air transport costs that are industrially funded. Since practically all industrially funded cost elements are variable costs, a 75-percent average reduction in the MATS transport fleet utilization rate would reduce the industrial fund by $156.6 million ($208.8 million times 75 percent). The industrial fund includes such cost elements as: fuels, oils and lubricants, travel expenses (per diem), rental of commercial equipment and facilities, contractual services, commercial transportation $156.6

Reduction in EASTAF and WESTAF military personnel pay and allowances: The authorized military personnel of WESTAF amounts to 16,089 (2,478 officers plus 13,611 airmen), and the authorized military personnel of ASTAF amounts to 27,070 (3,926 officers plus 23,144 airmen). These figures are based upon MATS presentations to civil airline management. Thus, the total military personnel in MATS' air transport units is 43,159. A 75-percent reduction in MATS average fleet utilization rate coupled with proportional increased use of commercial in lieu of military facilities and services would save the cost of approximately 75 percent of the total military personnel in EASTAF and WESTAF or some 32,370 military personnel. It is estimated that the annual per capita cost of military personnel in the Air Force is $4,648 (total Air Force budgeted military personnel pay and allowances for fiscal year 1960 is $3,923 million plus 844,000 total Air Force military personnel strength). Thus, the $150.5 million represents the estimated personnel savings (32,370) times the average per capita military personnel cost in the Air Force ($4,648). We have omitted any savings from MATS Headquarters since it is assumed that MATS Headquarters as the executive agency for the single manager of airlift service, or any DOD organization so designated, would be required to perform the military traffic management functions in a manner similar to that performed by MTMA (Military Traffic Management Agency) for domestic air movements 150.5

Reduced medical support costs for EASTAF and WESTAF military and dependent personnel: The estimated total saving of military personnel amounts to 32,370 (EASTAF and WESTAF). This saving represents 3.84 percent of the total Air Force military personnel. Total Air Force medical support as set forth in the budget amounts to $135.9 million. The number of military personnel and dependents no longer receiving medical support in EASTAF and WESTAF would equal approximately 3.84 percent of the total USAF number. Therefore, 3.84 percent times $135.9 million equals $5.1 million savings under this item 5.1

Reduced training support costs (other than training performed by and within MATS): The total Air Force training support program as contained in the President's budget amounts to $340 million for fiscal year 1960. The number of military personnel no longer receiving training for EASTAF and WESTAF would equal 3.84 percent of the total USAF number. Therefore, 3.84 percent times $340 million equals $13.1 million savings under this item 13.1

Contract augmentation to MATS: This is based upon the amount of funds appropriated in fiscal year 1959 for commercial contract augmentation. In addition to the funds indicated in the above table, there are other substantial sources of funds that would become available through military cost savings which we are unable to compute in dollar figures. Among these additional sources are such elements as: reduced recruiting costs, reduced logistic support furnished to MATS air transport units not included in or covered by cross-servicing reimbursable agreements, reduced military personnel welfare costs (supported either directly or indirectly by appropriated funds), administrative and overhead costs at all echelons, and certain costs related to communications 80.0

ATTACHMENT B

ESTIMATED COST TO THE DEFENSE DEPARTMENT TO MOVE 75 PERCENT OF ITS INTERNATIONAL AND OVERSEA AIR TRAFFIC COMMERCIALLY

We estimate the cost to the Defense Department to move 75 percent of its international and oversea air traffic (25 percent being handled by MATS with an average fleet utilization of 1.5 hours per day per aircraft) to be $457 million. This estimate is calculated on the first 9 months of 1958 average ton-mile yields (passenger and freight) of the U.S. certificated international, overseas, and Alaskan airlines. This estimate includes passenger traffic moving in first, tourist, and economy classes of services and therefore assumes that the Defense Department purchases as to classes of service available on international, overseas, and Alaskan flights would be comparable to the average purchased by the general public during the first 9 months of 1958.

The average ton-mile yields for the first 9 months of 1958, which represent average published tariff fares and rates then in effect, were calculated for international, overseas, and Alaskan certificated air carriers as follows:

$$\frac{\$13,279,000 \text{ (passenger operating revenues)}}{481,773,000 \text{ (revenue ton-miles of passenger traffic carried)}} = \text{a yield of } \$0.650$$

$$\frac{\$33,488,000 \text{ (freight operating revenues)}}{97,682,000 \text{ (revenue ton-miles of freight traffic carried)}} = \text{a yield of } \$0.342$$

These yields were applied to 75 percent of the Defense Department common user air transportation requirement for fiscal year 1960 as set forth in the President's budget for fiscal year 1960, p. 528.

Passenger:

302 million ton-miles (75 percent of 403 million ton-miles) × $0.650 = $196,300,000

Cargo:

762 million ton-miles (75 percent of 1,016 ton-miles) × $0.342 = $260,600,000

Total: $196,300,000 + $260,600,000 = $456,900,000

Mr. TURNER. In summary, our recommendations are as follows: If these aircraft are to be assigned to and operated by MATS without a major change in the Defense Department's policy as regards the use and role of the MATS transport fleet, we urge that the funds in question be deleted from the proposed aircraft procurement budget. It should be noted that we were advised last summer that the Department of Defense has undertaken a comprehensive study of its international and overseas air transportation policies. Since the proposed 10 jets may be an integral part of this overall subject, you may wish to defer a decision on this item by deleting it from the budget at least until such time as the Department has completed its study and it has been fully evaluated by all concerned.

However, if these planes are to be truly part of the weapons system and accordingly are to be assigned to and operated exclusively for and by a combat command, e.g., SAC, as discussed earlier, we believe that they should be viewed in the same light as other combat elements such as bombers, missiles, fighters, and so forth. In this connection, we naturally wish to see our defense team have the best equipment the Nation can produce and in amounts which the appropriate military and civilian authorities deem necessary and adequate for national security.

The entire future of the U.S.-flag international airline industry may be vitally affected by your decision.

Mr. Chairman, that completes my prepared statement. With your permission, I would like to make one additional short comment.

You accorded us the honor 2 years ago of appearing before your committee on this same subject. We talked at that time on many broader aspects instead of just the one facet to which I have addressed myself today. If you will remember, I believe the committee sympathized with our problems in this area, and indicated that there was considerable merit to our position at that time. However, a question was raised in the committee meeting as to whether or not we were in fact not too late. It was suggested that we would have been much better off, if you remember, Mr. Chairman, if we had been here 4 years earlier when the airplanes were just about to be bought.

May I suggest that we are now faced with a similar situation, and we are, I believe, appearing here today before you just before a whole new family of airplanes is about to be bought, because we believe that this may very well be the proposal which is really before you and really included in this budget.

The committee also expressed the opinion at that time that perhaps Congress should stop further expansion of MATS and urge the Department of Defense for its future needs to look to the commercial carriers. We believe we are again at this point at the present time, and this is why we are particularly appreciative of having the opportunity to come before you today. Thank you.

JET AIRCRAFT WITH AIRLINES

Mr. MAHON. How many jet cargo or transport planes, approximately, are in the hands of airlines, scheduled or nonscheduled, at this time?

Mr. TURNER. Twenty-one pure jets have actually been delivered up to this time I believe.

Mr. MAHON. Approximately how many commercial jet aircraft are on order?

Mr. TURNER. Among our members, about 280 of the pure jets are on order but not yet delivered. I am not talking about turboprops, now, but only the pure jets.

Mr. MAHON. Like the Boeing 707 or the Douglas DC–8.

Mr. TURNER. Yes, sir.

I want to make sure I answered your question correctly, Mr. Chairman. None of these that have been delivered to date are cargo airplanes. They are all combination airplanes.

Mr. MAHON. Are there jet cargo airplanes on order?

Mr. TURNER. Not on order as yet, no, sir.

Mr. MAHON. Will that be practical?

Mr. TURNER. As I understand it, there are several proposals by different manufacturers which are now being actively explored by several of our members, the ones that operate all-cargo type equipment now. I cannot answer "yes" or "no" whether they are going to be practical, except to tell you that my information is that some of our members are not only extremely interested but enthusiastic at the prospect of what can be done with these airplanes.

AIRLINES REPRESENTED BY ATA

Mr. MAHON. Your organization is made up of the large airline companies, such as American, TWA——

Mr. TURNER. Our membership, Mr. Chairman, consists of all of what we used to refer to as the certificated airlines. The supplementals now have a form of certificate, so for identification purposes perhaps I should say those with a route type of certification. This includes the trunks, the local service carriers, the helicopter operators, the all-cargo operators, the territorial carries, about 49 in all.

MEMBERSHIP OF INDEPENDENT AIRLINES ASSOCIATION

Mr. MAHON. Mr. Burwell, how many airlines do you represent?

Mr. BURWELL. Twenty-two; and, as Mr. Turner correctly characterized them, none of them are route-type carriers. Our primary field, we feel, is charter, which makes us peculiarly adaptable to the military needs.

Mr. MAHON. How much cargo and how many people did your members move in fiscal 1958, and approximately how many will you move in fiscal 1959?

Mr. BURWELL. I may need a little help on this.

Mr. MAHON. You may correct the record.

Mr. BURWELL. In round figures, domestically we moved on the magnitude of 200,000 troops in the so-called CAM's from base to base.

Mr. FORD. Each fiscal year?

Mr. BURWELL. Yes. That is a rough figure, Mr. Ford. That is probably not far off. Over the year, it is about 200,000 a year. I do not know, but could furnish for the record, the amount of MATS business that our members carried foreign and overseas. I could not give you a very accurate figure on that.

Likewise, I could furnish for the record some figures on the commercial charters which have been done. I am not sure I can get an accurate figure.

BUSINESS DONE WITH GOVERNMENT

Mr. MAHON. Could you give us some comparable information here?

Mr. TURNER. Yes, I can, Mr. Chairman. Our members last year carried about 48 million passengers.

Mr. FORD. For the Government?

Mr. TURNER. No. This is total operation.

Mr. MAHON. That was not the question.

Mr. TURNER. I am sorry.

Mr. MAHON. How many passengers and how much cargo did you move in fiscal 1958 and do you estimate you will move in fiscal 1959?

Mr. TURNER. For the Government?

Mr. MAHON. Yes.

Mr. TURNER. I do not have any figures on that.

Mr. MAHON. Do you have a rough idea?

Mr. TURNER. I would be glad to submit figures for you at a later date.

Mr. MAHON. How does the amount of business that members of your organization do for the Government compare to the business done by the independent airlines?

Mr. TURNER. The way we might get at it, the total dollar volume by our members for the first 7 months of this fiscal year, but including

the contract operations through the end of the fiscal year, amounts to about $40.2 million.

Mr. FORD. Passenger and cargo?

Mr. TURNER. Yes.

Mr. MAHON. Do you have a comparable figure, Mr. Burwell?

Mr. BURWELL. I think I can get you one, Mr. Mahon. I do not at the moment have it.

Mr. MAHON. Your operation, of course, is not as large.

Mr. BURWELL. No; but it might be in that general area because more of our business is Government business than his, percentagewise.

Mr. MAHON. Of course.

Mr. BURWELL. I think domestically our business would be $8 million or $10 million. The carriage of the troops I was referring to was domestically.

AIR FORCE PROCUREMENT OF JET CARGO TRANSPORTS

Mr. MAHON. Do you view with alarm the proposal of the Air Force to procure these jet transports?

Mr. BURWELL. I do, sir, as a manifestation, if our suspicions are correct, that it means an enlargement of their determination in effect to put us out of business.

Mr. MAHON. In other words, your statement, I believe, touches on this subject.

Mr. BURWELL. Yes, sir. I am in full concurrence with Mr. Turner's position.

REQUEST FOR $100 MILLION SET-ASIDE BY MATS

Mr. MAHON. What specifically do you want us to do in this appropriation bill with respect to the business of air transportation?

Mr. BURWELL. Specifically with respect to these 10 planes——

Mr. MAHON. I am talking about the whole matter. With respect to the 10 planes, you want to make sure they are not placed in competition with the type of work which you do.

Mr. BURWELL. Yes. Beyond that, sir, I suggest that immediately the only way to restrain the MATS people going further into this field is through the appropriation. We suggest the requirement that they set aside $100 million instead of $80 million as last year, and that whatever is set aside be the minimum rather than the maximum, because otherwise we have the question every year, which I do not have to enlarge upon. We go in there and they say, "Congress permitted us to do this much," and they turn around and fly it on their own planes and it does not mean a lot.

From the standpoint of the appropriation bill, we hope there will be a commercial carrier set-aside of about $100 million—I enlarged on why I think that is a reasonable area—and that it be the minimum.

Being small business, we hope you will do as you did last year and put in some language giving small carriers preference up to a point, with a set-aside.

Mr. MAHON. This being an appropriation bill, legislative provisions generally in the House would be subject to point of order.

Mr. BURWELL. That is right.

Mr. MAHON. In conference between the House and Senate at times legislation of that character can in parliamentary manner get into the bill.

Mr. FORD. I am referring to section 634 of last year's bill which reads as follows:

> Of the funds made available by this act for the services of the Military Air Transport Service, $80 million shall be available only for procurement of commercial air transportation services.

In line with Mr. Burwell's comment, are you suggesting the phrase "at least $100 million," or how would you phrase that?

NEED FOR GOVERNMENT BUSINESS

Mr. BURWELL. Whatever figure you put in, if you can say "at least," or in the alternative tie it in with the dollars of their own that they spend on MATS, it would be all right, because otherwise they simply carry that same traffic on MATS because inherently they are competitors in this area. "At least" certainly would be satisfactory.

Mr. MAHON. This language is not subject to being misunderstood, is it?

Mr. TOMPKINS. It certainly is, Mr. Chairman. I am an expert on that.

The Air Force took a position, and still takes the position, that this is permissive only, and is not an obligation.

For example, if they spend less than the total appropriation, they can save whatever they do not spend of the gross total appropriated to them out of this sum.

In other words, it is not out of their money but out of the civil carriers' money that they propose to come back to Congress and say, and I hope they do "We are economical. We did not spend all the money you gave us."

I spent quite some time with the Air Force on that subject a couple months ago and I am familiar with it. The committee gets tired of people hacking away at MATS. We leave them alone. While a new company, we got our new airplanes last summer, I think we are the largest charter operator in the Atlantic. We do a great deal of business.

This coming summer we have $3 million of firm contracts. This involves taking college groups and trade associations and what not over to Europe on vacation. We will take over 10,000 over this summer.

We try our best but we can never be, because charter business simply is not available in the volume we require, even for our little company, self-sufficient the year round. It simply is not there even if we had it all.

All transportation systems are dependent to some extent on Government assistance, whether it takes the form of Mr. Chalk's D.C. Transit, who gets a tax refranchize for a while, whether it is subsidy in the form of mail pay, or whether it is subsidy given to the Maritime Commission, or whether perhaps it is the large number of first-class passengers traveling on the scheduled airlines such as Department of Defense personnel. Its subsidy is support.

We all want to be independent of it but we have to make our way ourselves as best we can. We have tried our best and we are still trying.

We wish we didn't have to do a dollar's worth of MATS business because it is not profitable. It is a question of just trying to get us through the lean period of the year when there is not sufficient commercial business available no matter if we had it all. That is the crux of the problem and the reason we are up here so constantly.

The Air Force recognized that several years ago. They went off on a program of leasing aircraft. People would put in an order for new aircraft. Leases were terminated upon delivery to encourage people to buy new aircraft.

We did that and bought the most modern convertible aircraft we could find. We have some of the few aircraft equipped to go anywhere in the world without change of radio equipment, elaborately equipped with radio and electronics.

We are having a hard time because we are restricted to the charter field.

CRAF PROGRAM

Mr. FORD. Is that part of the CRAF to which you refer?

Mr. TOMPKINS. Yes, sir; it is.

Mr. FORD. Do either or both of your organizations propose that this appropriation be disapproved, particularly if it is going to be part of the MATS operation, and in the alternative come up with a program within the CRAF setup? Is that what you are suggesting as an alternative?

Mr. TURNER. I might try to answer that, sir. Our proposal is that if the purpose of these airplanes is to be put into the regular transport operation of the MATS fleet, we are then urging that this appropriation be disapproved. We are not urging that it be disapproved if it is for part of the combat forces, such as SAC.

Beyond that, we are suggesting that the existing national policy be applied with respect to international Department of Defense traffic and accordingly made available to the commercial carriers.

Historically, when traffic becomes available, the carriers invest their own money for the most modern and best type of equipment that can be bought to do the job.

We feel very certain that the adoption of this policy and the opening up, if you will, of the floodgates of this kind of traffic, in this kind of volume, will hasten the day when many more jet airplanes are in our fleets. Specifically, if Department of Defense cargo traffic is made available, all cargo type turbine-powered airplanes will be procured by the airlines, probably considerably sooner, and in greater numbers than otherwise would be the case. Such aircraft would be available for the CRAF program.

Mr. FORD. I am still not sure whether you are telling us that you are proposing to procure through your members aircraft on your own without any participation by the CRAF program or whether you are suggesting that it be done as part of the CRAF program.

Mr. TURNER. I am perhaps not getting your question, but perhaps this will help.

When aircraft are procured by the airlines, as soon as the order is signed, the carrier then enters into immediate negotiations with the Department of Defense for assignment of those airplanes to the CRAF program.

This happens before the airplane starts on the production line at the factory, so I think the two things are completely interrelated.

The day the airplane rolls off the line and is delivered to one of our members, if the Department of Defense needs it and the Defense Air Transport Administration allocates the airplane and sets it up that way, that day that airplane becomes part of the Civil Reserve Air Fleet.

Mr. FORD. You are not suggesting that the appropriation be disapproved, you go out and buy the aircraft separately and independently and then negotiate with the Department of Defense. You want to negotiate within the CRAF idea generally.

Mr. TURNER. May I put it this way, sir?

Obviously I cannot commit carriers to buy jet-powered cargo airplanes, but I think they will buy them before too long.

What I am saying is that it is our firm belief that if this military traffic is made available to them, they will buy more of them, and I believe they may buy them sooner.

Whenever the airlines buy them, and in whatever quantity, they will be made available to the Civil Reserve air fleet program.

Mr. BURWELL. In the main I agree with Mr. Turner on this. As you know, many of our members have aircraft in the CRAF fleet, and all of them are willing to put them in.

I certainly subscribe to his statement to the extent that if the 10 cargo jets are in effect really needed by SAC, and I am not competent to say whether they are or not, and are going really to be part of it, and be assigned to them, we have no comment, we have no basis on which to criticize.

However, if as we strongly suspect, if history is any precedent, they will be gotten with a strong military uniform on them but then will emerge as plush passenger planes, then it is such a discouraging blow to our people that they will never to be able to buy jets, and the Government then will have to buy all the jets.

Mr. FLOOD. I have no questions.

Mr. BOYLE. I have no questions.

Mr. LAIRD. Mr. Chairman, I cannot see how, unless these gentlemen have some ideas, these planes can be justified for SAC. I cannot see how SAC has any real use for planes like this.

Mr. MAHON. They have the KC–135's.

Mr. LAIRD. Certainly the planes they will build here will not be the kind of planes SAC wants.

Mr. TURNER. I am certainly not a military expert and I do not want any of you to think I am holding myself out as one.

However, there are some C–124's at the present time which are assigned to and operated by SAC. They are used exclusively for SAC support.

They are in an alert posture, comparable to SAC's posture. Our reference to procurement for that sort of an operation as part of the weapons system was with the thought that possibly the military, and I am not saying yes or no on it, would feel that procurement of these airplanes as a substitution for some of the C–124's might be justified.

Mr. MAHON. It has been a pleasure to have you gentlemen before us. We want to thank you.

If you have any further statements you may feel free to submit them to us.

Mr. TOMPKINS. Some time back the military came before the Congress and got considerable money to buy some transports for the Troop Carrier Command, a tactical squadron. Those airplanes now are flying passengers with stewards and stewardesses aboard. They were bought for troop carrier commands.

I think that is the fear. Ultimately they may not end up where they are supposed to.

Mr. MAHON. Thank you very much.

FRIDAY, APRIL 24, 1959.

NATIONAL RIFLE ASSOCIATION

WITNESSES

LOUIS F. LUCAS, EXECUTIVE DIRECTOR, NATIONAL RIFLE ASSOCIATION OF AMERICA

IRVINE C. PORTER, PRESIDENT, NATIONAL RIFLE ASSOCIATION OF AMERICA

Mr. FLOOD. Gentlemen, the committee will come to order.

I am advised that the first order of business is the group representing the National Rifle Association. I understand there are present Mr. Louis F. Lucas, and also Mr. Irvine C. Porter.

You decide between yourselves the order.

Mr. PORTER. Mr. Lucas will go first, and I will follow up.

Mr. FLOOD. All right. You may proceed.

Mr. LUCAS. Mr. Chairman, my name is Louis F. Lucas and I am here representing the National Rifle Association of America in my capacity as executive director of that organization. On behalf of more than 300,000 individual members and almost 9,000 affiliated membership groups, I express appreciation for the opportunity to appear before your committee in connection with the item of $300,000 recommended by the President in the Budget of the U.S. Government for the fiscal year ending June 30, 1960, under the title, "National Board for the Promotion of Rifle Practice, Army". It is my purpose to reaffirm to you the profound belief of our organization in marksmanship training for national defense and to inform you of its continuing vigorous support of the program of the National Board for the Promotion of Rifle Practice.

In order to further identify myself and to more fully explain my appearance here today, I am a retired colonel of the Army of the United States, having served with the 29th Infantry Division in World War II. Since I actively participated as a citizen soldier in the campaigns of Normandy, Northern France, Rhineland and Central Europe, I feel somewhat qualified to express an opinion concerning the need for adequate advance marksmanship training for the young men of America who will be our future citizen soldiers. Since my combat-connected physical disability precludes me from active participation in the military services, I am proud to be associated with the National Rifle Association of America which, more than any

other organization outside the Armed Forces, is so vitally concerned with national preparedness and the training of our people in the use of the basic weapon of national defense.

NEED FOR CIVILIAN MARKSMANSHIP TRAINING

Marksmanship training is an essential element of national defense. The development of new weapons has increased, rather than diminished, the need for the individual soldier to rely upon the weapon with which he is armed personally and with his own skill in using it. The ability to "hit the mark" cannot be acquired in a few hours of intensive training. It requires gradual learning under competent instruction and once acquired must be practiced if it is to be maintained.

Our Armed Forces realize the importance of marksmanship and the need for firearms knowledge. The ability of the fighting man to properly handle his personal arms is recognized as a necessary training function. The following statement appears in "Trainfire Troop Topics," Department of the Army pamphlet No. 355–14:

> Unlike some Americans of past generations, most men enter the Army today with little or no firsthand experience in handling firearms. Some of them have owned .22's and have hunted small game or fired at homemade targets. But the great majority lack even these experiences. Often they have little interest in learning the rifleman's skills, and one of the reasons for their lack of interest is fear—conscious or otherwise. Everyone tends to have some fear of things he doesn't understand, particularly when he knows that there actually is an element of danger involved. In today's Army, therefore, instructors in rifle marksmanship must first arouse the trainee's interest and replace his fears with confidence before any real learning can begin.

Since our military organization is based upon the concept of a professional establishment no larger than necessary to meet normal peacetime requirements, it must be reinforced in time of emergency by a citizen army. To be ready for combat, the Armed Forces must be ready for a general mobilization which involves the rapid induction of millions of civilians. All of our great wars have been fought in the main by citizen armies. Three times within the memory of persons now living, we have sent civilian armies into battles to defend the United States. In each instance our military commanders have reiterated the crying need for soldiers to be well-trained in the use of their basic weapon—the rifle.

So long as our young men are expected to do a soldier's job with a soldier's skill when necessity calls, there is a need for civilian marksmanship training.

CIVILIAN MARKSMANSHIP PROGRAM

The National Board for the Promotion of Rifle Practice is responsible for the promotion of rifle marksmanship among those civilians who are eligible for military service in case of war. The program is primarily a volunteer program sparked by that spirit of patriotism which is an American tradition. It is administered by the Director of Civilian Marksmanship of the Department of the Army. The training is conducted by rifle clubs affiliated with the National Rifle Association of America as a patriotic contribution to the national defense. Thousands of loyal citizens devote time and effort without pay, to instruct the youth of our Nation in rifle marksmanship. The grass-

roots of the program is civilian financed on civilian ranges. The money provided by the Government merely accelerates their enthusiasm and makes possible a valuable preparedness program at a minimum cost to the taxpayer. Dollar-for-dollar, no other program produces better returns or makes a better contribution to national defense.

The National Rifle Association of America, which operates with funds from dues of members and affiliated membership groups, is the civilian organization which carries the program to organized rifle and pistol clubs in all parts of America. I am confident that each member of this committee knows that no funds or ammunition made available by this appropriation will go directly to our association. We wholeheartedly support the program because of the established purpose of our organization to educate and train citizens of good repute in the safe and efficient handling of small arms and to promote efficiency in the use of such arms on the part of civilians who would be subject to military service in the event of war.

In order to receive an issue of ammunition or to obtain equipment on loan from the Director of Civilian Marksmanship, a club must meet certain requirements. It must (1) be affiliated with the National Rifle Association: (2) maintain a club membership of at least 10 physically fit citizens (between 12 and 18 years of age for junior clubs in the .22-caliber program and over 17 years of age for senior clubs in the .30-caliber program) who are not eligible to receive Federal aid for rifle activity from any other source; (3) fire annually for qualification purposes a prescribed course of fire, and (4) file annual inventory and firing reports. These requirements have been established to assure proper use of available Government assistance.

The executive officer of the board has informed you of the increased participation in the program during recent years, with 236,000 enrollments and 4,000 clubs and schools on December 31, 1958. With your permission, I would like to present briefly some information concerning activities of our association which also have increased due to this "NRA-National Board" cooperative marksmanship training effort.

	1956	1957	1958
NRA certified instructors	23,758	23,859	42,018
NRA hunter safety graduates	88,391	128,485	237,314
NRA qualification awards	295,551	316,232	366,093
NRA tournament participation	63,680	73,205	84,841
NRA classified shooters	62,874	82,029	94,547

Assistance made available to civilian rifle clubs through the Director of Civilian Marksmanship is the base of an effective program of civilian marksmanship training which should be expanded.

SMALL ARMS FIRING SCHOOLS

Once each year at Camp Perry, Ohio, the Small Arms Firing Schools are sponsored by the National Board for the Promotion of Rifle Practice and the National Rifle Association of America to develop qualified instructors who will train our citizens in the use of the basic military weapons of national defense. The purpose of these schools is to bring to civilians and to members of the various components of the

Armed Forces, not reached through training programs conducted with the active military services, information concerning the most modern methods of marksmanship instruction in order to raise the standards of performance in the use of individual military arms by the citizens of our country. (See pages 16–29 of the October 1958 issue of the American Rifleman.)

The significance of these schools is indicated by the fact that attendance in 1958 exceeding 4,200, including 1,583 civilians. The value of the instruction is evidenced by scores fired in competitive matches following the schools. The value to our country is reflected as these qualified people return to their military units and home communities to teach marksmanship to others. Civilian participation has increased considerably in 1958 and 1959 due to the fact that limited Government assistance for travel, to the extent of 5 cents per mile and $1.50 per diem, has been furnished to State civilian teams.

CONCLUSION

We, of the National Rifle Association of America, believe that the marksmanship training program of the National Board for the Promotion of Rifle Practice is a vital part of our national defense. We believe that the activity is economical for the Government and that the results obtained are far greater in value than the funds expended. We urge you to recommend approval of the appropriation of $300,000 and the provisions for supplying ammunition to the Board under section 630 of the general provisions of the budget for the fiscal year 1960.

Thank you, gentlemen, for your time and attention.

Mr. FLOOD. Mr. Porter, have you a statement?

Mr. PORTER. Yes, Mr. Chairman.

STATEMENT OF MR. IRVINE C. PORTER

Mr. Chairman and gentlemen of the committee, my name is Irvine C. Porter. I appear today as the president of the National Rifle Association of America, which, as its executive director, Mr. Louis Lucas has just stated, is composed of more than 300,000 individual members and almost 9,000 affiliated membership groups. I, also, appear as a civilian member of the National Board for Promotion of Rifle Practice, representing the country at large, this being the board whose appropriation is being considered by your committee today.

Please accept my thanks and appreciation for affording both Mr. Lucas and myself an opportunity to appear before your committee in support of this board's appropriation, which is in the sum of $300,000, as recommended by the President in his budget for the fiscal year ending June 30, 1960, under the title, "National Board for the Promotion of Rifle Practice, Army." I have been privileged to appear before this subcommittee and similar subcommittees in the Senate in support of this board and its appropriation on a number of occasions in the past, and I have come to Washington, again, from Birmingham, Ala., where I practice law, specifically for the purpose of urging this committee to fully support and approve that portion of the budget for the Defense Department for fiscal year 1960 which relates to, and supports, the activities of this board.

I am informed that this committee has previously been furnished a very detailed statement of the activities of the board during the last year by its executive officer, Col. Hugh W. Stevenson, who also fills the position of Director of Civilian Marksmanship, Department of the Army. This statement covered in detail the number of rifle clubs and schools enrolled under the board's program; the number of individuals involved; the attendances at the various small arms firing schools conducted by the board; the number of civilian teams attending the national competitions from the respective States and Territories, and the ammunition requirements of this program. I will not attempt to go into detail concerning those figures and statistics, but I do desire to suggest that a careful analysis of them justifies the conclusion that there has been a steady and healthy growth of the activities supported by the national board during the last several years, and this growth is, again, definitely expected and forecasted for fiscal year 1960.

Participation of civilians in this program is definitely on the increase, and as I have heretofore suggested to this committee, is directly related to the fact that Congress has seen fit to provide travel funds for State civilian teams, both rifle and pistol, to attend the national training schools set up at Camp Perry, Ohio, and has furnished sufficient ammunition to meet the growing needs and demands of board-sponsored activities throughout the country.

I cannot urge you too strongly to approve this budgetary amount of $300,000 as recommended by the President in his budget for the support of the national board during fiscal year 1960, in its entirety. I especially urge that you continue to approve the manner of handling the ammunition requirements of the board by authorizing the Secretary of Defense, under General Provision 630 of the President's budget, during fiscal year 1960, to transfer from agencies of the Department of Defense to the board ammunition from stock, or which has been procured from that purpose in such amounts as the Secretary may determine upon the requisition of the national board and without the necessity for reimbursement. In my opinion, this is the most important single requirement of this board. There are thousands of range facilities available throughout the United States, and hundreds of thousands of weapons which might be otherwise available for use by interested civilians, but without a sufficient quantity of ammunition, both .22 caliber and .30 caliber, being made available, it is impossible for this board to fulfill its primary function of promoting marksmanship training among able-bodied citizens of this country who might hereafter be called upon in the adequate and proper defense of it.

While the Board's program of activities are and have been expanding at the rate of approximately 15 percent per year, it is still my feeling, not only as president of the National Rifle Association, but, also, as a civilian member of this Board, that the Board's program is not as extensive as it should be for the best interest of this country. It is my opinion that it would be highly desirable and in the best interest of the proper defense of this country that every person now or hereafter eligible for military service should have a reasonable and adequate opportunity to fully familiarize himself with and become accustomed to the use of the basic weapon of the Army Forces of this

country, the rifle, under proper supervision and competent guidance. The National Board for Promotion of Rifle Practice is the agency which Congress created for this purpose, and I am certain that the gentlemen of this committee are reasonably familiar with that fact. I am certain, also, that there will not be a time in the foreseeable future when the necessity for the use of the rifle as a basic weapon in the defense of our country will not be of paramount importance. I quote Maj. Gen. J. H. Hinrichs, Chief of Ordnance, on this point. He said in an article published in the May-June 1957, issue of Ordnance, page 961, that:

> Even in an atomic war in which the Army could employ a wide spectrum of nuclear weapons, I can visualize many tactical situations in which an atomic blast would not satisfy the requirement; for example, destroying or capturing an enemy platoon. Bringing down an atomic blast on such a target would be like cracking nuts with a pile driver. In any case, there would be many occasions around the periphery of an atomic blast, and in other operations like exploiting breakthroughs and mopping up, in which small arms would be absolutely vital. *I can visualize no war in which our soldiers will not need a personal weapon for attack or defense.*
>
> In the widely dispersed units that will be necessitated by the threat of atomics, it will be "mighty lonely out thar without Old Betsy resting in the crook of your arm." [Emphasis added.]

While we have before us today the main issue of the approval of the $300,000 appropriation for the support of the National Board for fiscal year 1960, I should like to pass on to the members of the committee the thought that not only myself but many of my colleagues on this Board, particularly those who are civilians, feel that Congress could well afford to expand the activities of this Board many times, and that such an expansion could be accomplished in an orderly fashion without any waste of Government funds and at a very low per capita cost. We feel that such an expansion would be in the best interest of the proper defense of this country and that the results would be apparent in the vigorous undergirding of the character of our people. Furthermore, we are convinced that there is a tremendous interest in the activities of this Board in the preinduction age group (which has jumped from about 40,000 participants in 1949 to over 132,000 participants as of the first of this year in the activities of the National Board, alone), which is not being met at all throughout the country. I feel confident in saying that, if this committee and that of the Senate were to so direct and provide the necessary budgetary support, the figure which I have last mentioned of 132,000 preinduction youngsters could be increased almost tenfold in 3 or 4 years.

With reference to the funds provided in this budget for civilian team travel for fiscal year 1960, there has been provided the sum of $56,000, which compares favorably with the sum of $57,000 in the budget for fiscal year 1959. In the year prior to 1959 only the approximate sum of $25,000 for this purpose was provided. This increase last year caused the total number of teams, both rifle and pistol, attending the national training schools set up by the Board at Camp Perry, to jump from 174 to a total of 229. As both Colonel Stevenson and Mr. Lucas have indicated, these teams constitute a vital source of competent instructors for the expanding of the Board's program throughout the country. Looking ahead, I believe that it can be safely said that, should this committee provide the funds, this aspect of the

Board's program could be increased in rapid order in the same degree that took place between the budget years 1958 and 1959.

In conclusion, permit me to say that I wish to thank the chairman of this committee and those members present for permitting me to attend this hearing and for the patient attention given during this presentation. I wish to state further that if there are any questions which any member of this committee desires to have answered, both Mr. Lucas and I are ready now to undertake to answer or discuss them to your satisfaction. If we do not now know, or have the necessary information or answer, we will endeavor to get it and furnish it to the committee as part of the record of this hearing.

May I say, Mr. Mahon, that we again very definitely are willing to furnish you any additional information on inquiries you might have about this Board's program, and would sincerely invite any inquiry that you might have in that respect at the present time.

(Off the record.)

Mr. FLOOD. I notice present at the hearing this morning distinguished members of the Department of Defense and other agencies identified with missile warfare. I will not name the bureau, because that is not particularly important. But to hear this excellent presentation made in behalf of the rifle association and the importance to national defense of the basic rifle, especially those interested in limited warfare, which includes me, is good for their souls and I am sure they have listened with rapt attention and have been impressed.

Mr. PORTER. Mr. Chairman, I trust they will back us up in their missile program in the thoughts we have advanced here.

Mr. FLOOD. I would like to note when Colonel Stevenson was here in the regular hearings, he presented the details of this program at some length to the full subcommittee, and the acting chairman at that time was the distinguished gentleman from Florida, Mr. Sikes, on whom this subcommittee leans heavily for advice in connection with this program.

Mr. MAHON. Thank you very much, gentlemen. It has been helpful to have your statement, and we will again give consideration to your requirements.

Mr. PORTER. Thank you.

CIVIL AIRLIFT

Mr. MAHON. We shall insert in the record at this point a statement by Representative Porter of Oregon, on airlift.

(The statement follows:)

STATEMENT OF HON. CHARLES O. PORTER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OREGON

Mr. Chairman, I appear to urge your committee to reenact for fiscal 1960 section 634 of Public Law 85-724 (72 Stat. 729), the Department of Defense Appropriation Act for the fiscal year ending June 30, 1959, changing only the figure of $80 million for civil airlift to language specifying that not less than $100 million shall be expended on civil airlift. I agree with the Chamber of Commerce of the United States that $100 million is a fair figure which allows for growth.

I believe strongly we should encourage a continuous buildup of civil airlift, with an increase each year. If the amounts devoted to civil airlift are up one year and down the next, we cannot realistically hope that civil airlift will consistently grow to a size sufficient to help meet national emergency needs in the event of all-out war, limited war, or other emergency.

Therefore, I am opposed to the Department of Defense proposal advocating a one-third reduction in use of civil airlift down to $54 million for next year. This is a sizable reduction from the $80 million figure contained in section 634 (of which $71 million have already been obligated as noted in the letter of April 22, 1959, to me from the Air Force which letter I would like to insert in the record following my statement). It also offers no assurances whatsoever to the civil carriers that they will participate in the carriage of Government traffic because the Department of Defense opposes any language in the bill.

While proposing to make a one-third cut in the use of civil airlift, the Defense Department also seeks a sizable increase in funds to be devoted to the Government-owned and Government-operated airline, MATS.

Acceptance of this Defense Department proposal would reverse the sound policies adopted by the Congress for the last 3 fiscal years (1957, 1958, and 1959) which have consistently called for a reduction in Government competition with private enterprise and increased use of civil air.

As an alternative to reenactment of section 634 with a new figure of $100 million, I commend to your careful attention enactment of a provision providing that no part of the appropriations shall be used to pay for the carriage in Government-owned and Government-operated aircraft of more than 50 percent of the passenger requirements, and 50 percent of the cargo requirements, of any of the military departments or the Department of Defense for air transportation between the United States and foreign countries.

There is ample precedent for such action in the so-called 50–50 law (46 U.S.C. 1241(b)) regarding U.S. flag ocean vessels. For a number of years, until permanent legislation was finally enacted, the appropriation bills carried a 50–50 provision on ocean shipping. It appears to me that what is fair for ocean shipping is equally fair for air transportation. In fact, the evidence before your committee is that out of each dollar given to the Military Sea Transport Service, some 70 cents goes to the U.S. commercial operators, whereas by contrast MATS proposes that out of each dollar you might give to them for next year they would retain 81 cents and give only 19 cents to the U.S. flag civil industry.

It is obvious to me that a transport plane, like an ocean vessel, and unlike a tank or a bomb or a gun, is something that has a regular use in peace as well as in war. Therefore, the more transport planes that can be built up by the civil industry, the fewer that will have to be purchased and operated entirely at the taxpayers' expense.

The bipartisan Hoover Commission unanimously recommended that:

"* * * only after commercial carriers have been utilized to the maximum practicable extent, should transportation on service carriers be authorized."

This is a sound principle and who can really argue against it?

The Department of Defense itself recognizes the validity of this principle in its DoD Directive 4500.9 which clearly directs that the congressional policy statements in the Transportation Act of 1940, and the Civil Aeronautics Act are to be followed, that the resources of DoD "will not be employed in such manner as will adversely affect the economic well-being of the commercial transportation industry," and directs that, instead of Government transportation, "commercial transportation service will be employed for the movements of personnel or things when such service is available or readily obtainable and satisfactorily capable of meeting military requirements."

This DoD directive is sound. If the Defense Department applied it consistently there would be no problem of Government competition with private, taxpaying, air transport enterprise.

But, illogically, the Defense Department has limited the application of its own DoD directive to traffic "within the continental United States." Why should there be a different policy outside than inside the country? For no good reason, there just is.

Consequently, outside the continental United States, Government-owned and Government-operated airlines, in the form of MATS, and an equally large fleet of administrative aircraft, fly parallel to the U.S. flag airlines, and compete daily with them in the carriage of peacetime Government traffic.

I say the same policy of noncompetition should govern in the international traffic, especially because (1) our U.S. flag carriers abroad have enough to do to fight foreign-flag competition without also fighting a U.S. Government airline; (2) we should be encouraging the growth of U.S. international civil airlift because the greatest defense need is for long-haul transport planes capable of spanning the oceans.

Your own committee, Chairman Mahon, in House Report 2104 of the 84th Congress, 2d session, stated:

"In this regard, President Eisenhower's Air Coordinating Committee 1954 Report on 'Air Policy' (p. 17) had this to say:

" 'The Government should, to the greatest extent practicable, adjust its use of air transportation so as to use existing unutilized capacity of U.S. air carriers.'

"The committee strongly endorses that statement."

How big is the "existing unutilized capacity of United States air carriers," to quote your own Appropriations Committee report?

I have taken a survey of all United States civil airlines, large, small, and medium size, as to the amount of unused space which they expect to have during the fiscal year ending June 30, 1960, to transport additional traffic.

A tabulation of the replies received indicates that these civil airlines expect to have over 1.2 billion ton-miles of capacity during fiscal year 1960 to carry military traffic.

I note that this is more than enough airlift to carry all the passengers and cargo now transported by the Military Air Transport Service.[1]

It impresses me that the more the U.S. civil air fleet can be enlarged the greater will be our national airlift capacity to cope with emergency or wartime requirements.

For example, I am struck by the statement of a former Under Secretary of the Army that if all Army peacetime movements were made by air there would automatically be available for duty at any one time an entire additional division of troops.

Consequently, I feel that the Army, Navy, and Air Force could all, with resultant economies in time, manpower, materiel, and money, make far greater use of civil airlift in peacetime than they are now doing.

As you may recall, on December 9, 1958, the Democratic Advisory Council's "State of the Union Message" stated: "We must build, too, our air transport facilities for a maximum of three to four modernized divisions, to be quickly transported to where they may be needed."

Previous testimony before your committee indicates that there is less than enough airlift in combined military and civil hands to move one division of troops along with their tanks, missiles, and other equipment.

Therefore, our party has called essentially for a threefold expansion of the national airlift.

The greater use that is made of airlift in time of peace, the greater amount of airlift will be available in time of war or other emergency.

I do not believe the Defense Department in its peacetime movement of traffic in choosing between surface and air transportation has followed the statement in Senate Report 543 of the 85th Congress which was repeated in Senate Report 1937 on the present year's appropriation for the Defense Department, namely that:

"* * * in evaluating relative costs of transportation, the Department should recognize the specific monetary value of time saved as an important factor * * *."

Nor has there been sufficient implementation of Army Regulation No. 59–5 specifying the use of air transport as a normal mode of transportation to develop a wartime airlift capability and to save the time of soldiers and officers, and in the case of cargo to reduce the procurement in the amount of cargo and pipeline and stockpile. That this directive is not being implemented fully at the present time is shown by the fact that the services are moving some half million passengers by sea across the Pacific compared to only about 90,000 by air.

I believe the increase in airlift capacity called for by our party's advisory council statement quoted above can be achieved by a rerouting of peacetime military traffic so as to use civil airlift rather than surface means.

It is difficult to see how the airlift capacity needed for an emergency will be available if it is not built up in moving peacetime traffic.

If it is desired by the Department of Defense to have on hand for emergency use additional transport planes over and above those which exist or which would

[1] MATS lift in MATS (Government-owned and Government-operated) planes for next year, fiscal year ending June 30, 1960, is estimated at: Passenger ton-miles, 252,998,000; cargo ton-miles, 873,025,000; total, 1,126,023,000 ton-miles per year. ("House Defense Appropriations Hearings for Fiscal 1960," p. 922.)

The total estimate of the civil airlines replying to my questionnaire as to the ton-miles of unused space available to fly military traffic for the same period (fiscal year ending June 30, 1960) show: 1,300 million ton-miles, or more than enough unused space to carry all the traffic which MATS is planning to fly.

Based on a similar survey in your "House Defense Appropriations Hearings for Fiscal 1958," pt. 2, pp. 1711–1718, inclusion of those civil airlines which have not yet replied to my questionnaire would double the above estimate of unused civil airlift.

Consequently, it can reasonably be concluded that the whole U.S. civil air transport industry has more than twice enough unused space to fly all the passengers and cargo which MATS will move.

be added to the civil fleet if the Defense Department made increased peacetime use of the civil fleet, then those planes should be considered additional and should not be allowed to take traffic away from the civil carriers. It is obvious that a Government-owned and Government-operated transport plane will still be available in the event of war whether or not it carries peacetime loads, but one that is employed in commerce has to receive sufficient revenues to continue to operate and failing to receive such revenues these planes are liable, as has been too often the case in the last 2 years, to be sold to foreign companies or foreign countries and so they are lost to the U.S. civil reserve air fleet.

I hope, Mr. Chairman, that you will insert the attached tabulation of industry replies following my statement, and ask the Department of Defense to comment on each of the replies where suggestions have been made as to the policy which the Government should follow.

A look over the industry comments in this tabulation shows that many of the U.S. civil airlines, Mr. Chairman, have expressed their firm conviction that they operate more cheaply than MATS or the Government's fleet of administrative aircraft. It was pointed out in your earlier hearings this year (House Defense Appropriations Subcommittee Hearings for Fiscal 1960, pt. 4, p. 949) that while the charges made by MATS for its services do not include huge items of expense such as the cost of the airplanes themselves, the military payroll, etc., these items may be added statistically for comparison with similar operations by private industry.

Chairman Mahon, I believe the Defense Department should be required to make such a statistical comparison of the costs of MATS and of the fleet of administrative aircraft with the costs of the civil airlines listed in the attached industry survey, using the same statistical basis for both the Government planes and the civil planes.

I believe MATS should be, as you expressed it in your House Report No. 1830 of the last session, a hard core. In other words, it should be a genuine nucleus capable or organizing the civil fleet immediately into airlift action in the event of either local or general war. The pattern of the Military Sea Transport Service is, in my opinion, a sound one where over 70 percent of the peacetime traffic is carried by the civilian merchant marine on arrangements by the Army, Navy, and Air Force through MATS; whereas, by contrast, of the traffic turned over to MATS less than 25 percent is given to the civil carriers whose growth should be promoted, and now the Defense Department wants to reduce the participation of civil air still further down to only 19 percent.

Throughout our country's history, we have relied on our civilian merchant marine to answer to the most heroic calls of duty in all our wars. We have not felt it necessary to build up, in the Navy, an organization which directly competes with and parallels the American merchant marine.

I believe the same treatment which has proved so successful throughout our history should be accorded to our air merchant marine.

DEPARTMENT OF THE AIR FORCE,
OFFICE OF THE SECRETARY,
Washington, D.C., April 22, 1959.

Hon. CHARLES PORTER,
House of Representatives.

DEAR MR. PORTER: I refer to your letter of April 16, 1959, in which you requested information on the latest MATS call contract awards for commercial augmentation as announced in Aviation Daily of March 26 and April 15, 1959. In addition, you asked how much of the $80 million as set aside in section 634 of the Defense Appropriations Act for fiscal year 1959 for purchase of commercial airlift has now been obligated.

I am pleased to forward herewith a copy of the Summary of Abstract of Negotiated Call Contract Awards made by MATS for the period April, May, and June 1959. You will note that awards made on March 23, 1959, totaled $5.7 million and the awards made on April 1, 1959, totaled $2.2 million. MATS has obligated a total of $70.7 million on commercial augmentation contracts as of April 3, 1959. Attached for your information is a summary and breakout of the fixed, call and common carriage contracts awarded during fiscal year 1959.

I trust this information will be helpful to you and if I can be of any further assistance to you, please do not hesitate to call on me.

Sincerely yours,

W. P. FISHER,
Major General, USAF,
Director, Legislative Liaison.

Summary of replies to Congressman Charles O. Porter's questionnaire on the unused space available on U.S. flag civil airlines for moving additional military traffic for the year ending June 30, 1960

Company (alphabetical order)	Space available for military traffic for year ending June 30, 1960			Industry comments (extracts from airline telegrams or letters)
	Ton-miles	Dollars	Passengers or cargo and routes	
AAXICO (Florida)	27,000,000		Domestic cargo	
	21,000,000		Overseas passenger or cargo; either Atlantic or Pacific.	
Alaska Airlines (Washington)	4,366,624	$2,314,431	75 percent passengers and balance cargo.	"The Government's policy of not competing with private business should be extended to the airline industry. In event it necessary that military operate certain transport aircraft, these operations should be confined to noncompetitive routes rather than competitive situation as now exists between Seattle and Fairbanks where MATS carrying 52 percent of all available passenger traffic."
Alaska Coastal Airlines (Alaska)				"MATS does not operate in this section of Alaska."
Allegheny Airlines (District of Columbia).	5,500,000	6,000,000		
Aloha Airlines (Hawaii)	2,276,475	2,502,216	Passengers; between Honolulu and Hilo, Kona, Maui, and Kauai.	"MATS currently carries Armed Forces personnel to rest camp in Hilo. * * * Suggest policy that would place civil carriers in better position maintain pool of aircraft and trained personnel."
American Airlines (New York)	333,000,000		Passengers	Estimates are necessarily theoretical because we need more information on origin and destination of military traffic and cannot predict practical load factors. Policy should be (1) Air Force to determine how much emergency airlift is needed, (2) subtract capacity that can be supplied by civil air carriers, (3) deficit to be met from military sources or noncarrier organizations, (4) Air Force should be permitted to fly passengers and cargo as long as "the total daily or monthly flying operation would not exceed the flying hours required for military training and readiness."
	175,000,000		Cargo	
Bonanza Air Lines (Nevada)	5,300,000			"No significant amount of service by MATS or OTMD LBDFFT is being performed over our routes."
Braniff Airways (Texas)		1,049,000	International passengers and cargo and mail.	"It is obviously to advantage of Government to use existing civil air transport capacity to help assure sound international U.S. flag operation and avoid possible duplication of cost of both Government operation and civil subsidy."
California Eastern Aviation (District of Columbia).				"Company does not have available at the present time any aircraft for transport activities."
Central Airlines (Texas)				"The conditional proposal of the Defense Department of reduction in civil airlift and greater use of MATS and other government aircraft could result in a terrific loss of Central's revenue through the following channels: (*a*) The frequent military traffic to and from over 55 military installations that are located in Central's area. (*b*) The daily (Monday through Friday) military recruit traffic in conjunction with other airlines coming from Houston San Antonio, El Paso, and Amarillo to Fort Smith (Fort Chaffee); and from Oklahoma City to San Antonio (Lackland Air Force

Central Air Transport (California)	12,300,000	2,500,000	Passengers and cargo; transatlantic (or Pacific).	Base). (c) The seasonal reserve movements (May 30 to 1st week of September) for the 4th Army area by extra sections and charter movements. (d) The 6 months' reserve traffic (on Sunday only) coming from various points to Fort Chaffee, Fort Sill, Fort Riley, and Fort Carson—all served by Central Airlines." "We estimate we can carry as much as 50 percent more military traffic. * * * The military can fly cheaper on Central than on military aircraft." "We suggest that contracts on a 12-month basis be negotiated between the Government and the small cargo carriers."
Chicago Helicopter Airways (Illinois)	364,077	1,227,896	Passengers and cargo; within 60-mile radius of Chicago.	"We feel Government should not compete with private business in air transport field."
Continental Airlines (Colorado)	135,000,000 50,000,000	40,000,000 12,500,000	Passengers Cargo	"Strongly opposed Government competition in air transport field as transport carriers should be strengthened and with CRAF provisions could immediately convert to defense use in the event it was necessary."
Hawaiian Airlines (Hawaii)	10,200,000	2,835,000		"Unless there occurs through adoption of the Board's [CAB] new policy by the Department of Defense long-term stability in MATS business at a reasonable price, we will be forced to seriously consider the abandonment of our project."
Hempel Helicopter & Air Taxi (Missouri).				"We are saving the Government money and time by operating an air taxi service to and from Scott Air Force Base, Ill. This base is headquarters of the World Wide Military Air Transport Service. At the present time for a 1-way trip we are charging $12 per passenger. I understand that this same trip by staff car had been costing the Government $44 per passenger, and also took 3 and 4 times longer for the passenger to reach his destination. It would seem to me that any business that can be allotted to the civil carriers, whether small operators like ourselves, or larger airlines, would be able to save the Government money as well as keep a constant reserve of trained pilots and equipment that could be converted for use in case of a national emergency."
Mohawk Airlines (New York)				"We do believe the greatest possible use of scheduled airlines by the military is essential."
National Airlines (District of Columbia).	152,900,000	81,650,000		"Acceptance of these recommendations (ATA letter to Defense Department Nov. 20, 1958) would provide the Nation with an improved emergency airlift capable of efficient utilization of both civil and military air transport resources and a solution to the problem of MATS competition."
North Central Air Lines (Minnesota)	19,000,000	15,000,000	Passengers and cargo; "over our entire system."	
Northeast Airlines (Massachusetts)	23,605,000 46,418,000	10,481,000 27,387,000	Cargo Passenger	"It would be much more economical for the U.S. Government to continue using the services of the scheduled airlines to the maximum extent of available payload to MATS and other Government aircraft. It is our firm belief that if commercial aircraft is used to the maximum extent possible it would help to strengthen the position of the commercial airline industry in the United States and therefore would be in the best interest of the Nation's defense and economy."

Summary of replies to Congressman Charles O. Porter's questionnaire on the unused space available on U.S. flag civil airlines for moving additional military traffic for the year ending June 30, 1960—Continued

Company (alphabetical order)	Space available for military traffic for year ending June 30, 1960			Industry comments (extracts from airline telegrams or letters)
	Ton-miles	Dollars	Passengers or cargo and routes	
Northwest Airlines (Minnesota)	32,520,000	$19,382,000	International and overseas routes (does not include continental domestic operations); transpacific; States to Alaska; Seattle and Portland to Hawaii.	"In view of the size of our unused capacity figures, we are concerned by the indication in your wire that the Defense Department proposes sizable reduction in civil airlift and greater use of MATS and other government aircraft. This brings up the traditional MATS argument that carriage by MATS itself is more economical than use of the certificated airline services. The inherent fallacy of this argument is the fact that MATS' operating costs have never been fully analyzed on a basis which would reveal a proper comparison with commercial airline costs. If full MATS' operating costs, including depreciation and total personnel costs, were ascertained, we are certain they would exceed comparable commercial airline costs. • • • We feel strongly that such [MATS] competition has hindered development of a strong civil air transportation system, particularly in the Pacific area where Northwest conducts its international service. We have frequently had occasion to review the published timetables of MATS and find that the frequencies of service and total lift capacity far exceeds that of the two certificated flag carriers combined. As noted above, development of certificated air transportation in the Pacific has undergone a much slower growth than in the Atlantic due to the different economic and cultural conditions existing in the Orient. The great stake which the United States has in improvement of economic and social ties with the Orient requires the maximum development of a strong commercial air service in this area. To the extent that development of traffic flow by an extensive military air service, such commercial and economic progress is definitely hindered. Further, to the extent that military air transport services are conducted on a parallel basis with certificated commercial services operating with unused capacity, there is wasteful duplication of expense and, consequently, of the taxpayers' money."
Overseas National Airways (District of Columbia).	48,000,000	12,000,000	Passengers and cargo; Atlantic or Pacific.	"This [increased use of airlift] obviously means that the present [military] force can be more effective, or a smaller force with a smaller payroll can be equally effective."
Pacific Northern Airlines (Washington)	6,361,414	3,367,111	Passenger	
	6,220,500	1,458,707	Cargo; on Seattle Anchorage route parallel to McChord Air Force Base, Washington; to Elmendorf Air Force Base, Anchorage, route of MATS.	

Panagra (New York)	14,741,000	11,358,000	Passenger	"Transportation of nonstrategic cargo and personnel can be provided less expensively by commercial carriers than by government."
	3,159,000	1,658,000	Cargo	
			Mainline route from Balboa, Panama, Canal Zone, to Buenos Aires, Argentina, and for its domestic routes in Ecuador and Bolivia.	
Riddle Airlines (Florida)	32,000,000		Cargo; domestic (if MTMA, logair not renewed).	"Riddle Airlines negotiating procurement of additional new jet-powered equipment for common carriage operations which would make available in late 1960 an additional 16,000,000 ton-miles' capacity through utilization of replaced aircraft."
	9,000,000		Cargo, domestic schedule routes	
Southern Airways (Georgia)	6,438,900	4,380,000	Passengers and cargo	"We appreciate your efforts."
Trans-Texas Airways (Texas)				"We are opposed to competition by the Government with private business in the air transportation field."
Trans World Airlines (New York)	31,900,000	18,500,000	Passengers; New York, London, Frankfurt; New York, Paris (both directions).	"TWA urges the adoption of a congressional policy directing the military use of civil air transport for not less than 50 percent of military air traffic movement to reduce the serious competitive impact of the MATS operation. Precedent for such action already exists. Such a split of military traffic surface movement between MSTS and private U.S. ships is in effect. The extension of that sound policy to air movement and the resulting increased use by the military of civil air carriers for peacetime traffic will insure an expanded civil air fleet to serve the national defense in any emergency."
	44,500,000	17,800,000	Cargo; New York, London, Frankfurt; New York, Paris (both directions).	
Twentieth Century Airlines (California).	50,544,000	10,108,800	Passengers or cargo; could cover most any portions of the MATS routes.	"MATS should use the civil carriers for the bulk of the normal lift required month in and month out and MATS should then supplement the civil carriers during peak periods."
Wien-Alaska Airlines (Alaska)	1,648,213	1,742,161	Fairbanks to Fort Yukon, Barrow, Galena, Nome, Kotzebue, and such beyond points as Cape Lisburne Wales, Northeast Cape.	
World Airways (Washington)	6,000,000		Passengers or cargo	"We have been forced to severely curtail our transportation activities during the past year principally because of lack of military contract business. * * * We recommend that legislation be enacted which would require DOD to set aside at least 50 percent of its total airlift business for civil air carriers. * * * Civil air carriers can serve normal airlift requirements of Army, Navy, and Air Force better than MATS because MATS may abandon normal airlift services in times of crisis."
Zantop Air Transport (Michigan)	7,008,010	1,261,440	Cargo	"Through an expanded program of utilizing and building a larger civil aircraft fleet, a network of air logistics could be set up for the combined needs of the Department of Defense and the American public; in so doing mobilization in an emergency would already be in effect offering the ultimate at a critical time when the citizens of this great country are for the first time in history digging out of the rubble and havoc brought by enemy destruction."
Total for all airlines replying to questionnaire.	[1] 1,323,271,213	308,462,762		

[1] Ton-miles per year.

Views of Chamber of Commerce of the United States on the Defense Budget for 1960

Mr. Mahon. The committee is in receipt of a statement from the U.S. Chamber of Commerce on the Defense Department which will be inserted at this point.

(The statement follows:)

Statement of the Chamber of Commerce of the United States

March 25, 1959.

Hon. George Mahon,
Chairman, Department of Defense Subcommittee,
House Appropriations Committee,
The Capitol, Washington, D.C.

Dear Mr. Mahon: The enclosed statement and appendix reflects the views of the Chamber of Commerce of the United States on the fiscal 1960 appropriation request for military functions of the Department of Defense.

I would appreciate your making this statement a part of the record of your current hearings on this subject.

Cordially yours,

Clarence R. Miles.

The Chamber of Commerce of the United States submits the following recommendations regarding the fiscal 1960 budget for military functions of the Department of Defense:

1. Congress should approve the President's request for $40.8 billion in new obligational authority. This amount, plus $6.6 billion in unobligated carryover funds, should be adequate to provide sufficient funding for all essential defense projects and programs during the period under consideration.

2. Congress should take full and immediate advantage of any savings opportunities in the fiscal 1960 budget and should provide the military services with incentives for further economies by authorizing the Secretary of Defense to plow back into research programs conducted by the three services any actual savings they achieve through improved organization, planning, and management.

3. Congress should set in motion the legislative actions—and direct the Defense Department to take appropriate administrative actions—that are prerequisites to the achievement of numerous long-range savings opportunities. Here again, the Secretary of Defense should be given authority to permit the services to divert, to their priority research programs, savings achieved through improved organization, planning, and management.

4. Congress should approve the regrouping of defense appropriation accounts, as proposed in the 1960 budget, and should expedite conversion to a functional appropriation structure under which most of the funds required by the Armed Forces would be appropriated to the Department of Defense, instead of to the separate services.

These recommendations are based upon careful study and evaluation of the Defense Department budget and related programs by the chamber's national defense committee, which consists of 42 representatives of the Nation's major defense-supporting industries.

The members of the national defense committee do not profess to be military experts. But they firmly believe that, in a democracy such as ours, national security is everybody's business. Because the defense budget involves operations in which business judgment can and should be applied, we welcome the opportunity to present some views which we hope will prove helpful to this subcommittee in evaluating and resolving the issues raised by the President's 1960 request.

CONGRESS SHOULD APPROVE $40.8 BILLION REQUEST

The fundamental issue underlying the fiscal 1960 Defense Department budget is whether the $40.8 billion requested by the President will continue to provide sufficient forces and weapons to deter Soviet aggression. The chamber believes the forces and equipment that these funds and $6.6 billion in unobligated carryover funds would provide should be adequate for the period under con-

sideration. It also is reasonable to assume that more unobligated funds will become available as additional marginal and less promising programs are terminated in favor of projects with greater potential.

There are three major reasons why the national chamber takes this position.

First, the proposed budget is consistent with the need for maintaining a level of military expenditures our economy can support for an indefinite period of time.

Because the Communist threat to our Nation's security is both immediate and long-term, the chamber believes it is imperative that our preparedness program be geared to the long pull, instead of a sequence of costly and inefficient crash programs designed to cope with glibly predicted moments of maximum peril. The resources we spend for defense, particularly during a period such as this, must be spent in a manner that does not weaken the economic system that is the real foundation of our national security. Unless this is done, inflation could become an even greater threat to our security than the more obvious dangers of a shooting war. The worst thing we could do is to push the panic button on the mythical Federal cash register every time the Kremlin flexes its military muscles.

Second, there are limitations on the amount of money that can be utilized effectively during the research, development, test and evaluation stages of our major weapons programs.

Any discussion of the adequacy of the President's request evolves around two budget programs that have been the target of most criticism—research and development and major procurement.

For procurement, the budget request is $13.3 billion; for research and development it is approximately, $3.8 billion—or a total of $17.1 billion for both programs. This is nearly $4 billion more than the $13.3 billion appropriated for these purposes for fiscal 1958.

In addition to the request for $17.1 billion in new spending authority, there is available—unobligated and unspent—$5.7 billion in procurement and $167 million in research and development funds, making a total of nearly $23 billion available for spending on these two programs.

Worthy of note is the fact that only $4.7 billion of the $17.1 billion request mentioned above will actually be spent in fiscal 1960. Under the circumstances—meaning the lead time involved in the research, development, test, evaluation, and procurement of most military weapons—any money Congress might add to the President's $17.1 billion request would not accelerate fiscal 1960 spending because practically all of it would not be spent until fiscal 1961 and thereafter.

It also should be remembered that the major barrier to more rapid progress in many of our weapons programs—according to Dr. Wehrner von Braun, Dr. Keith Glennan, and USAF Missile Chief General Bernard Schriever—is technology, rather than money. And there are strict limitations on the amount of technology that more money could buy during fiscal 1960.

Third, the adequacy of our defense effort cannot be measured soley in terms of dollars appropriated or spent, and should not be measured solely in terms of quantitative difference between our capabilities and those of the Soviet Union.

With rare exceptions, those who describe the President's defense budget as an "invitation to disaster" and advocate enormous increases appear to be laboring under the impression that there is some magic number of dollars which, if spent, would insure adequacy. We do not subscribe to this theory for these reasons:

1. Money is just one of many elements that contribute to the adequacy of any defense program. As already mentioned, equally as important are technology, which cannot be purchased in unlimited amounts, and sound management, which must emanate from an effective and efficient organization.

2. Congress could double the defense budget tomorrow and we would have no greater assurance of adequacy than at present. In fact, the appropriation of huge sums of money without the safeguards of adequate manpower and management resources could do great harm to our overall defense position.

3. Money will not buy back Russia's 5-year headstart in the development and production of long-range ballistic missiles.

The major weakness in the argument that we must match Russia ICBM for ICBM, etc., was expressed in a recent speech by Adm. Arleigh Burke, Chief

of Naval Operations, who placed the emphasis where it should be—on the qualitative development of our defense programs—and then added:

"There is no point trying to equate our requirements and capabilities with the enemy's. Our requirements are quite different and our capabilities must be developed around our own needs. We do not need to engage in an endless arms race with the Soviets in ballistic missiles, any more than we have attempted to race them in numbers of submarines or army divisions."

The chamber's support of the President's $40.8 billion request is also based upon recognition and acceptance of several fundamental facts that are well known to the members of this subcommittee. For example, it should be remembered that every budget for our military services involves certain carefully calculated risks, reflecting the best judgment of our military and civilian intelligence agencies, our senior military experts, outstanding scientific consultants, the Secretary of Defense, the National Security Council, and the President—who in this instance is one of our Nation's greatest military leaders of all times. Total security has never been an attainable goal and is even less so in an age of 25,000-mile-per-hour missiles.

And the mere fact that the budget contains less money than the chiefs of the four military services wanted does not mean—as some are claiming—that the budget is inadequate. As General Curtis LeMay told the House Armed Services Committee during recent hearings on extension of the draft law:

"No Chief of Staff has ever been satisfied with the percentage of the resources that have been allocated to him."

This is because the military judgment of the minimum requirements for a particular military service includes only token consideration of the economic and political factors that the Secretary of Defense and the President must add to that judgment in deciding upon the final budget figures.

The most significant and least publicized observation in the recently released budget reservations of each of the military service chiefs was the final paragraph of the statement by General Pate, USMC Commandant, who said:

"The foregoing statement of reservations, it should be remembered, are made from my vantage point as a chief of service. While to me they involve matters of personal conviction, it is patent that other considerations additional to those available to me as a military man, must be and have been applied to the problem areas in which I entertain the foregoing reservations."

To give the military services everything they want would mean one of two things—crushing taxation or deficit spending and devastating inflation. The ultimate result of either would be to weaken, rather than strengthen, our overall defense position.

SEEK IMMEDIATE SAVINGS AND PROVIDE SAVINGS INCENTIVES

Although the chamber supports the President's overall request for $40.8 billion, we are convinced the Nation can and must have more defense than it is getting for the vast amount of money already being provided for preparedness purposes. Opportunities for savings are almost unlimited but few are achieved—primarily because there are numerous incentives to expand and grow but very few to economize.

Under the circumstances, the chamber recommends that this subcommittee—in reviewing the detailed Defense Department justifications for each fiscal 1960 appropriation request—take full and immediate advantage of any savings opportunities you can identify, particularly in the area of military personnel and operation and maintenance. Any such savings should be used to offset any increases in top-priority programs that the subcommittee may conclude are absolutely essential—thereby holding the total appropriation to $40.8 billion.

The chamber also recommends that the military services be encouraged to take advantage of additional savings opportunities—through improved organization, planning, and management—by permitting the Secretary of Defense to transfer any actual savings to the "Research and development" accounts of the service or services which achieve them. For example, if the Army could effect a true saving of $50 million in its "Operation and maintenance" activities, the Army, subject to the discretion and direction of the Secretary of Defense, would be permitted to use that money in basic or applied research activities which hold the most promise for the improvement of ground force weapons. This is not to say that an adequate research appropriation should be dependent upon savings in other areas. But it is an established fact that none of the

services ever obtains as much research money as they think they should have. This incentive proposal would provide a means for obtaining additional funds, subject to the approval of the Secretary of Defense, and at the same time would accelerate some badly needed organization and management improvements.

There are eight specific items in the 1960 Defense Department budget that the chamber believes this subcommittee should examine with extra care. They can be summarized as follows:

Military personnel.—For the principal Army activities financed by this account, the budget shows a $10 million decrease, as compared with fiscal 1959 estimates. The decreases are in subsistence and permanent change-of-station movements. For the Navy, there is a $3 million increase in subsistence and a $13 million increase for permanent change-of-station movements. For the Air Force, there is a $2.1 million increase for permanent change-of-station movements. In view of the frequent overprograming in these acvivities, and in the light of relatively stable force levels in the Navy and Air Force, the chamber seriously questions the need for the proposed increases in Air Force and Navy funds for subsistence and permanent change-of-station movements.

The opportunities for savings by restricting flight pay payments also should be thoroughly investigated. According to recently published reports, annual expenditures for this purpose now exceed $200 million, $781,000 of which goes to 459 admirals and generals who are still rated as pilots. We can see little justification for officers who have completed, on the average, more than 20 years of service, being permitted to continue to engage in training flights in order to qualify for flight pay.

Operations and maintenance.—The overall fiscal 1960 request is $10.5 billion, an increase of approximately $200 million as compared with 1959. Fiscal 1960 expenditures are estimated at $10.3 billion, the same as in 1959. The chamber seriously questions the need for the proposed $200 million increase in spending authority. The greatest of all opportunities for savings is in this area of defense activities. These long-range opportunities will be discussed in greater detail later in this statement. Meanwhile, here is a brief service-by-service discussion of some immediate savings possibilities in this category.

Army.—Overall Army appropriations for 1960 are down $38 million, as compared with fiscal 1959 and a pending supplemental. But increases totaling $62.3 million are proposed in funds for major overhaul and maintenance and so-called armywide activities. In reviewing these requests, the subcommittee should inquire about such matters as: (*a*) The maintenance of multiple headquarters organizations, such as the $49 million requested for "Army departmental headquarters" and the $42 million sought for "Headquarters technical services"; (*b*) the lack of coordination—with new procurement programs—of the overhaul and maintenance activities of the services; (*c*) a similar lack of coordination—with new procurement programs—of the spare parts programs of the services, in spite of the progress made under the standardization and cataloging program; (*d*) the continuing resistance to the development of an integrated defensewide communications system, as reflected in the Army's request for a $25 million increase in funds for communications services.

Air Force.—Funds for six of the seven types of activities financed by this account would be increased by $130 million for 1960, as compared with the combined total of funds already provided for 1959 and a pending supplemental for 1959. Some of these increases—particularly the proposed $75.4 million increase for logistical support—appear to be excessive in view of the ever increasing, but poorly justified, size of the Military Air Transport Service.

Navy.—Six of ten Navy programs financed by this account would be increased $123 million in fiscal 1960, whereas the amount approved for 1959 was virtually the same as the 1959 appropriation. The largest single increase that seems questionable is a $30 million increase for aircraft and facilities, as compared with a $1.4 million decrease between 1958 and 1959. This account is directly related to the flight pay problem discussed earlier because it also is estimated that the fuel and maintenance cost of aircraft utilized by all the services in qualifying for flight pay is approximately $180 million annually.

SEEK LONG-RANGE SAVINGS AND PROVIDE SAVINGS INCENTIVES

In addition to the 1960 budget items mentioned above, the national chamber has identified numerous long-range savings opportunities that merit the prompt and careful attention of this subcommittee, other congressional committees, and the Secretary of Defense. Achievement of these savings depends upon the enact-

ment of legislation, repeal of legislation, or appropriate administrative action by the Department of Defense and several other executive agencies.

The chamber recommends that Congress initiate a vigorous program to make certain these savings are achieved. To the extent that they require administrative actions which, in some measure, must be initiated by the military services, we recommend the same incentive arrangement discussed earlier in this statement.

These long-range savings opportunities can best be summarized under eight broad categories. In some cases, they can be related to specific accounts in the budget. In others, across-the-board savings would be possible. No attempt has been made to translate them into a specific dollar savings estimate because any such estimate would be sheer guesswork. But it should become obvious that they would make possible substantial savings that could be used to minimize any future increases that may become necessary in top-priority programs.

The following actions are considered necessary:

1. Insist upon full and prompt utilization of authority given the Secretary of Defense, in the Defense Reorganization Act of 1958, to curtail multiple development of the same or similar weapons and to eliminate unnecessary overlapping and duplication in a dozen or more support-type activities.

The Secretary of Defense should be commended for the steps he has taken to establish truly unified commands and streamline military lines of authority, pursuant to the Reorganization Act. On the other hand, a new so-called function directive issued December 31 made no changes whatsoever in the overlapping roles and missions of the separate services and, therefore, failed to face up to the basic cause of the long standing and costly controversy between the services regarding their respective roles in space exploration and missile development. And except for the appointment of a Director of Defense Research and Engineering, very little has been done or is planned in the direction of improved organization and management of the support side of our multibillion-dollar Defense Establishment.

There has been no utilization of the so-called McCormack amendment to the 1958 law, which gave the Secretary authority to place under one service or one agency any of the many activities that are common to two or more military departments. Worse yet, the so-called single manager plan, which was hurriedly conceived in 1955 to ward off the Hoover Commission proposal that common supplies and services be placed under a separate Defense Supply and Service Administration, has completely bogged down. No new commodities have been added to the plan since late 1956 and the vast savings predicted by defense officials when the plan went into effect have not been realized. The Navy's network of bureaus and the Army's many technical services—each with their separate administrative, fiscal, legal, and procurement organizations—remain intact. And longstanding proposals for partial or complete consolidation of management responsibility for medical services, communications, finance, and other common-type services are no closer to accomplishment than they were the day the so-called Unification Act was enacted 12 years ago. We think of the Department of Defense as the Nation's sword, but its shape still looks more like a pitchfork—with the forks going in all directions—than a single sharply honed blade.

2. Overhaul and modernize the Armed Services Procurement Act in order that space-age weapons can be developed and produced quicker and cheaper.

The House Appropriations Defense Subcommittee has a major stake in the outcome of legislation (S. 500; H.R. 5137) introduced by Senator Saltonstall and Representative Bates to completely rewrite this 12-year-old law because this is the law that governs, in broad terms, how nearly half (about $21 billion) of the defense budget is spent.

The Defense Reorganization Act of 1958 established the framework for reorganizing the organization and management of our combatant forces, but left those forces dependent upon a model T procurement law and organization. Many provisions of the 1947 law are obsolete, unrealistic, and unnecessarily restrictive, and contribute to unnecessary delays and costs that no longer can be afforded or tolerated.

For example, the law still stresses the use of a type of procurement—formal advertised bids—that is both impractical and uneconomical in buying most space-age military equipment, and discourages use of the type of procurement—competitive negotiation—that experience has clearly demonstrated is the most efficient and most economical. The law also encourages excessive procurement

of costly custom-made products, notwithstanding the fact that less costly commercial models would be entirely satisfactory in many cases, and does not provide for full utilization of the unparalleled industrial know-how, ingenuity, and resourcefulness that has put the United States head and shoulders above the rest of the world in the production of top-quality, low-cost consumer goods.

Congress would accomplish much more in speeding up the development and production of missiles and other complex weapons by overhauling the Armed Services Procurement Act than it could by appropriating needless billions of additional dollars to be spent under the present obsolete and restrictive procurement procedures. Until such time as the law is amended to recognize the complexity of the weapons being procured, and to not only permit but encourage the use of improved methods of procurement for complete weapons systems, the efforts of this subcommittee and the Secretary of Defense to achieve more defense for each procurement dollar will be seriously hampered.

3. Support the closing of marginal and unnecessary installations and the disposal of surplus Government-owned industrial facilities.

As recently as 2 years ago, Nelson Rockefeller, then Chairman of the President's Commission on Government Organization, estimated that the armed services were continuing to operate—in many cases because of political pressure—at least 200 installations or major facilities that no longer were necessary.

In his fiscal 1959 budget message, the President called attention to this problem, pointing out that "keeping * * * nonessential installations in operation, thereby diverting personnel and funds from our true defense requirements at the expense of our combat capability, poorly serves our defenses and the general public."

This subcommittee, in acting on the 1959 budget, expressed disappointment in the economies achieved by the closing of installations that were no longer necessary and called for a speedier reduction in the number now in use or in standby.

Because of constantly changing military requirements, and in the light of continuing reductions in the size of the Active Forces, the Secretary of Defense, during recent months, has proposed the closing or curtailment of activities at nearly 40 installations. But almost every such proposal has run into a strong congressional opposition—based, in most cases, on exaggerated claims regarding the potential impact of the proposed actions on the economy of the adjacent communities.

The chamber takes the position that under no circumstances can the mere fact that the economy of a community is related to Federal payrolls be sufficient justification for the continued operation of an installation or facility that has outlived its usefulness. At the same time, any such installations should be closed on a reasonable time schedule and with maximum advance notice.

4. Insist on acceleration of the lagging Defense Department program to curtail or close business-type activities providing, for Government use, products and services readily available at comparable or even lower prices from privately owned taxpaying firms.

The 1955 Hoover Commission Report on Business Enterprises identified 2,600 military commercial and industrial-type activities in 48 categories, employing upwards of 600,000 persons and representing an original capital investment of 15 billion tax dollars. It estimated that at least 1,000 such activities could and should be closed without jeopardizing our national security. The national chamber endorsed that conclusion.

For 2 years, the Pentagon made reasonably good progress in reviewing the need for approximately 1,700 such activities. By December 31, 1957, in spite of considerable congressional resistance, 268 such activities had been closed, 127 were in the process of being closed, 57 had been curtailed and 133 were in the process of being curtailed. Definite decisions to continue approximately 250 activities also had been reached.

But a recent Pentagon progress report indicates that the program ground to an almost complete halt during 1958. During the entire 1958 calendar year, only 24 activities were closed and each involved only a handful of employees.

The Senate Small Business Committee has expressed its concern over the slow rate of progress in curtailing such activities and has suggested the need for legislation to require greater action in this field. A similar expression, plus a mandate for prompt action, by this subcommittee should be most helpful.

Military Air Transport Service

There is no more fertile field for achieving sound economies in our defense budget than in the elimination of functions which are needlessly competitive with private enterprise. Accordingly, the chamber believes that the very substantial role played by the Military Air Transport Service in the day-to-day airlift responsibilities of our Armed Forces should be examined carefully with this objective in mind.

Last year, Congress indicated its approval of placing greater reliance on commercial air carriers, rather than expanding MATS, by stipulating that $80 million of the appropriation for air transportation was to be used only for the purchase of commercial airlift. In view of the long-standing reluctance of MATS to utilize commercial carriers to meet its transport requirements, this appears to be a logical method for securing compliance with this objective. Therefore, the chamber urges that the subcommittee again set aside a specific amount which will help insure that the policy established by Congress will be carried out. Since MATS presently is contracting only about one-fourth of its total traffic to commercial carriers, we recommend that the figure be increased to at least $100 million for the 1960 appropriation and similarly designated for use only for procurement of commercial air service by MATS. (In contrast, the Navy's Military Sea Transport Service reported that it had contracted with the private maritime industry for 78 percent of its total financial outlay for surface transportaion service during 1958.)

The most significant savings to be realized in placing greater reliance in commercial carriers can come about in connection with jet aircraft. We are now at the threshold of the problem of who shall acquire commercial-type jet equipment—the civil air carriers at their own expense, or MATS at the expense of the taxpayers.

The airlines are already committed to the purchase of a large number of jet planes during the next several years. They stand ready to acquire even more if increased military requirements should justify it. The Nation is thus assured of a jet fleet adequate for its air transportation needs. The new jets will be adaptable to military use and will be available on short notice to MATS at all times through the Civil Reserve Air Fleet plan now in effect. The total cost of this jet fleet will be approximately $3 billion.

We have learned that the proposed defense budget includes funds for the acquisition by MATS of 10 transport-type jet aircraft at an initial cost of approximately $65 million. This proposal must be recognized for what it is—a fresh expansion of MATS into the transport activity which properly should be delegated to civil air carriers. If past performance in the buildup of MATS is any indication, subsequent requests for additional jet planes will follow, and we will have brought about a transition of the present uneconomical duplication of civil and Government air transportation systems into the jet age. The eventual cost of this duplication to the taxpayer will be substantial.

Reliance on the commercial jet fleet through CRAF will truly represent maximum airlift of the most modern equipment at minimum expense to the taxpayers. Accordingly, the chamber urges this subcommittee to specify in the appropriation language that funds requested for this purpose, in the amount of approximately $65 million, should not be used for procuring commercial-type jet aircraft.

We also are concerned about continuing Government competition with the commercial aircraft overhaul and maintenance industry. The three military branches maintain and operate aircraft repair depots throughout the country which compete directly with commercial facilities. These commercial facilities are able and, in fact, eager to furnish their services at a cost which would permit savings to the Government if all cost factors are considered. It seems to us this offers an opportunity to curtail a business-type Government activity, and encourage the growth of a vital national defense industry without endangering our national defense posture. We hope this subcommittee will also inquire into this situation and take whatever action is found to be warranted.

5. Recommend two major improvements in manpower procurement and manpower utilization policies and programs.

One of the costliest aspects of our national security program—in terms of both dollars and efficiency—is the training of young men to replace the approximately 500,000 officers and men who leave military service each year. For this reason, Congress has passed numerous laws during recent years to increase the attractiveness of military service as a career. But in acting on H.R. 2260 to extend the Universal Military Training and Service Act for 4 years, Congress virtually ignored the major cause of the continuing high rate of turnover.

The problem stems from the fact that the Army is still inducting approximately 100,000 men a year and their average age is 23, as compared with 18½ for enlistees. For a variety of reasons, less than 5 percent of all inductees reenlist. But the Defense Department and the House and Senate Armed Services Committees appear to be reconciled to perpetuating this problem, in spite of the fact that the law gives the President more than adequate authority to come to grips with it.

The chamber recommends that this subcommittee urge the President and Secretary of Defense to take immediate action to modify the order in which qualified young men are called into service, in order that the average age of inductees can be reduced and the chances of retaining inductees, on a career basis, improved.

The other manpower problem that merits this subcommittee's special attention, plus aggressive action, relates to the use of military personnel in jobs that can, and in most cases should, be performed by civilians. This problem was spotlighted in your report accompanying the 1959 Defense Department budget, but there is no evidence that corrective action has been taken or is planned.

A startling illustration of this problem came to light late in the last session of Congress, when House Report 2512 disclosed (page 28) that nearly 30 percent of the 104,000 persons engaged in civilian-type financial management work in the entire Defense Department are military personnel. In the Air Force alone, 42 percent were military. Only 24 percent of the 970 comptrollers in the entire Defense Department are civilians.

Defense officials late last year proudly announced that, during the past 3 years, 87,500 civilian jobs had been eliminated at a saving of $480 million annually. The chamber recommends that this subcommittee make an effort to determine how many of these 87,500 jobs are now filled by military personnel, contrary to the oft-expressed wishes of Congress.

6. Curb the accumulation of surplus personal property and insist on modernization of procedures for the disposal of such property.

The magnitude of this problem was dramatically related in this subcommittee's hearings on the 1959 Defense Department budget and, therefore, need not be repeated here. The point that should be emphasized, however, is that the situation has gotten worse instead of better—in spite of your subcommittee's sharp criticism of the reluctance of the military services to take the "vigorous action" that is necessary.

A year ago, surplus personal property—as distinguished from real property—was being generated at the rate of $6 billion annually. According to Assistant Defense Secretary Perkins McGuire, the rate is now $8 billion a year and it is costing $100 million a year "to carry in stock $22 billion worth of excess and long-supply inventories." He also said the services now have on hand $24 billion worth of surplus personal property, $4 billion of which is in the hands of disposal officers. Mr. McGuire also warned that some $60 billion worth of major combatant equipment in use "is becoming obsolete fast."

A precise course of action, including a specific time table and periodic progress reports, to bring this enormous problem under control is urgently needed and should be a major recommendation of this subcommittee in its report on the 1960 Defense Department budget. The subcommittee also should give favorable consideration to pending proposals for relaxation of the $49 million ceiling now placed on the funds that may be expended annually from disposal receipts for surplus disposal purposes. At the same time, Congress should guard against any indiscriminate disposal program that would have severe economic impact.

7. Limit military public works to projects and programs of a compelling military necessity.

Although appropriations for this purpose are considered apart from the funds for other military functions of the Defense Department, they are really inseparable and represent a sizable portion of the annual defense outlays. Furthermore, four of the five members of the Military Construction Subcommittee are members of this subcommittee.

Defense officials contend the 1960 military public works program is restricted to projects of a compelling military necessity. But they said the same thing last year—after which Congress found a considerable amount of "fat" and trimmed $377 million from the $1.7 billion appropriation request.

The chamber believes the Defense Department should be commended for getting its military public works program to Congress much earlier this year, and also for its proposal to reduce the amount of carryover funds from $1 billion at the end of the current fiscal year to $444 million at the end of fiscal 1960.

On the other hand, the chamber believes Congress should question such items as:

(*a*) The acquisition of an individual 4,574 acres of land, at a cost of $2.5 million, when the armed services already have more than 29 million acres of land, much of which is not being used.

(*b*) The failure of the Defense Department to resolve the Bomarc-Nike-Hercules duplication question, as it was instructed to do in the Senate Armed Services Committee report accompanying the 1959 military public works appropriation.

(*c*) The 80 percent increase—from $500,000 to $900,000—in funds already authorized for the winter Olympic games.

(*d*) The construction of several hospitals at installations close to hospitals where the patient load is well below capacity.

8. Review and repeal or amend as may be necessary the approximately 30 laws that require the use of defense dollars to help achieve unrelated social and economic objectives.

This subcommittee's report accompanying the 1959 Defense Department budget included the following observation: "We should never lose sight of the fact that the sole basic purpose is to provide for the military requirements of the Nation."

But the fact remains that there are now on the statute books approximately 30 laws (see app. A) which establish a multitude of guidelines and legal restrictions that every military contracting officer must abide by before awarding each contract. These include the Buy American, Walsh-Healey, and Davis-Bacon Acts, "fair" share for distressed areas, conserve critical materials, etc. In addition, there are many Executive orders that impose such requirements as geographic dispersion of contracts, nondiscrimination in employment, and integration of procurement and industrial mobilization plans.

On an individual basis, a case can be made for absorbing some such objectives into the military procurement process. But the accumulative result of the ever-increasing number of such requirements is to seriously hamper efficient buying and management of contracts and further increase the cost of our defense program.

REVISE DEFENSE APPROPRIATION STRUCTURE

The national chamber was pleased to note, when the 1960 budget became available, that it incorporates three of the chamber's recommendations to this subcommittee in testimony on the 1958 and 1959 appropriation requests. These are the single operations and maintenance account for the Navy, the broader definition of research and development, now also including test and evaluation, and the regrouping of all defense appropriations into functional or activity categories. These are steps in the right direction because they should strengthen congressional control over defense spending, make the budget an easier document for the public to understand, and minimize the need for transfer authority. But virtually all of the new spending authority requested by the President still would be appropriated to the military services, instead of to the Department of Defense.

The chamber still believes, as we advised this subcommittee in testimony on the 1959 budget, that the present method of appropriating most defense funds to the military services is deficient in that it:

1. Is not realistically related to our defense objectives.

2. Overstresses the separateness of land, sea and air concepts in a defense pattern which requires complete coordination of all three to meet tactical and strategic military goal.

3. Vests in the military chiefs of the three services major control—plus considerable economic and political power—over funds approximating one-half of the total national budget.

4. Minimizes effective civilian control over the military services. The interposition of civilian service secretaries cannot be regarded as enhancing civilan control because they, by the very nature of the organization of the Department of Defense and the manner in which funds are provided, must become champions for their particular service.

Furthermore, the current appropriation system is partly to blame for the continuing interservice rivalries. This stems from the fact that each service has been appropriated its own funds to accomplish objectives which it feels are most important, and these objectives have generally included each being completely equipped to fight a war itself. Thus we still have—in spite of the Defense Reorganization Act of 1958—races in each of the services to research and develop weapons designed to accomplish the same military objectives; competition for scarce manpower to do such work; and similar unnecessary triplication in the procurement and supply fields and in general overhead activities.

There is general acceptance of the theory that the power to manage any operation effectively requires control of the funds that finance it. We should follow this tested and proven principle in the largest management job in the world. To give a man such as the Secretary of Defense responsibility for the success or failure of running this important department and then to provide funds to his subordinates so they can make a mockery of his efforts is completely incongruous.

Under the existing arrangement, the best Secretary McElroy can do is to exercise a negative-type of control over most appropriated funds. If the funds were appropriated to the Department of Defense—as they should be—on a functional or activity basis, the Secretary then could exercise positive-type control over them by directing—within a plan established by Congress—such funds into the channels required to meet the strategic and tactical demands of the Nation's defense.

The chamber strongly recommends that this subcommittee give thorough and careful attention to consolidating appropriation items in each category and broadening and accelerating the conversion to a functional defense appropriation structure. Particular attention should be given to the need for consolidated appropriations for research and development and procurement activities.

Appendix A

Fact Sheet on Statutes, Executive Orders and Regulations Reflected in the Armed Services Procurement Regulation

(In a September 1958, speech at Orange, N.J., former Deputy Assistant Secretary of Defense (Supply and Logistics) Cecil Milne sharply criticized the large number of statutes military contracting officers must make certain they are complying with before each contract is awarded. In response to a national chamber request, one of Mr. Milne's associates prepared the following tabulation of these laws, plus numerous Executive orders.)

It is stated in ASPR 1–101 that the regulation is "issued by the Assistant Secretary of Defense (Supply and Logistics) by direction of the Secretary of Defense, and in cooperation with the Secretaries of the Army, Navy, and Air Force, establishes for the Department of Defense, uniform policies and procedures, relating to the procurement of supplies and services under the authority of chapter 137, title 10 of the United States Code, or under other statutory authority." In addition to chapter 137 of title 10, United States Code, which is the codification of the Armed Services Procurement Act of 1947, as amended, other statutes specifically cited in the provisions of ASPR include the following:

(*a*) 10 U.S.C. 2202 (section 638 of the Defense Appropriation Act, 1953). (Cited in foreword re authority for issuing ASPR.)

(*b*) Walsh-Healey Public Contracts Act, as amended (41 U.S.C. 35–45). (ASPR 12–600; Walsh-Healey Public Contracts Act.)

(*c*) Defense Production Act of 1950, as amended. (ASPR 1–302.3; production pools.)

(*d*) Small Business Act of 1953, as amended. (ASPR 1–700; small business concerns.)

(*e*) Cargo Preference Act (46 U.S.C. 1241(b) and 10 U.S.C. 2631). (ASPR 1–309; preference for U.S.-flag privately owned ocean carriers.)

(*f*) Agriculture Trade Development and Assistance Act of 1954. (ASPR 1–310; procurement by Barter-Commodity Credit Corporation.)

(*g*) Davis-Bacon Act (40 U.S.C. 276a–2(a)). (ASPR 12–403.1; construction contract clause.)

(*h*) Buy American Act (41 U.S.C. 10 a–d). (ASPR 6–100 and 6–200; Buy American Act—supply, service and construction contracts.)

(*i*) 44 U.S.C. 321–324. (ASPR 2–202.4; publishing in newspapers.)

(*j*) National Security Act of 1947, as amended (5 U.S.C. 171–172j).

(*k*) Economy Act of June 30, 1932, as amended (31 U.S.C. 686). (ASPR 5–700; procurement under the Economy Act.)

(*l*) Appropriation act restrictions on procurement of foreign supplies. (ASPR 6–300; title as above.)

(*m*) 10 U.S.C. 2383 (emergency purchases of war material abroad). (ASPR 6–600; duty and custom.)

(*n*) The Tariff Act of 1930 (19 U.S.C., chapter 4). (ASPR 6–603; customs duties and drawbacks.)

(*o*) Assignment of Claims Act of 1940, as amended (31 U.S.C. 203, 41 U.S.C. 15). (ASPR 7–103.8; assignment of claims.)

(*p*) Renegotiation Act of 1951, as amended. (ASPR 7–103.13; renegotiation.)

(*q*) Eight-Hour Law of 1912, as amended (40 U.S.C. 324–326). (ASPR 12–300; 8-hour law other than construction contracts.)

(*r*) Copeland (Anti-Kick Back) Act (18 U.S.C. 874 and 40 U.S.C. 276c). (ASPR 12–400; construction contracts.)

(*s*) 10 U.S.C. 2382 and 7300. (ASPR 7–104.11; excess profits.)

(*t*) 28 U.S.C. 1498. (ASPR 9–102; authorization and consent-patents.)

(*u*) 18 U.S.C. 791 et seq. (ASPR 9–106; classified contracts—Espionage and Censorship Act.)

(*v*) 35 U.S.C. 181–188. (ASPR 9–106; classified contracts—filing of patent application.)

(*w*) Atomic Energy Acts of 1946 (42 U.S.C. 1801–1819) and of 1954 (42 U.S.C. 2011–2296). (ASPR 9–107.2; contracts relating to atomic energy.)

(*x*) Act of February 24, 1919, as amended, (6 U.S.C. 15). (ASPR 10–202.1; U.S. bonds or notes—options in lieu of sureties.)

(*y*) Defense Bases Act, as amended, (42 U.S.C. 1651). (ASPR 10–403; workmen's compensation insurance overseas.)

(*z*) Longshoremen's and Harbor Workers' Compensation Act (33 U.S.C. 901). (ASPR 10–403; workmen's compensation insurance overseas.)

(*aa*) Internal Revenue Code of 1954 (title 26, U.S.C.). (ASPR 11–000; Federal, State, and Local taxes.)

(*bb*) Act of February 23, 1887 (18 U.S.C. 436). (ASPR 12–200; convict labor.)

(*cc*) 40 U.S.C. 321–326. (ASPR 12–401; statutes and regulations—8-hour law, construction contracts.)

(*dd*) Fair Labor Standards Act of 1938, as amended (29 U.S.C. 201–219). (ASPR 12–700; Fair Labor Standards Act of 1938.)

(*ee*) Federal Property and Administrative Services Act of 1949. (ASPR 13–203; disposal.)

(*ff*) 10 U.S.C. 2667. (ASPR 13–600; use of Government-owned industrial facilities on work other than for a military department.)

(*gg*) 50 U.S.C. 1173. (ASPR 13–600; see ff. above.)

(*hh*) Defense Appropriation Act provision requiring gratuities clause. (ASPR 7–104.16; gratuities and appendix D.)

In addition to the above statutes there are, of course, many statutes which although not specifically cited in ASPR, do form a basis for the provisions contained in it or are reflected in the provision in ASPR. Examples of statutes in this category would be: Chapter 1 of 10 U.S.C., setting forth definitions; part IV of 10 U.S.C. pertaining to service, supply, and procurement, which contains important chapters such as chapter 131, Planning and Coordination, chapter 135, Encouragement of Aviation, chapter 139, Research and Development, chapter 141, Miscellaneous Procurement Provisions, chapter 145, Cataloging and Standardizations; title II of the First War Powers Act; the Miller Act; statutes relating to appropriated funds; acts relating to construction contracts; the mutual Security Act of 1954, and the act of May 11, 1954, often referred to as the Disputes Act.

In addition to the above statutes the provisions of ASPR specifically cite at least five Executive orders. These are:

(*a*) Executive Order 10582, dated December 17, 1954.

(*b*) Executive Order 10096, dated January 23, 1950.

(*c*) Executive Order 325A, dated May 18, 1905.

(*d*) Executive Order 10479.

(*e*) Executive Order 10557.

The following regulations issued by other agencies insofar as they pertain to procurement are implemented for Department of Defense use in ASPR:

(*a*) General Services Administration regulations.

(*b*) Regulations of the Secretary of Labor.

(c) Defense manpower policy No. 4, as amended, issued by Director of Defense Mobilization.
(d) Rules and regulations published by the Business and Defense Services Administration.
(e) Regulations of Commodity Credit Corporation.
(f) General Accounting Office regulations.
(g) Department of Commerce regulations.
(h) Federal Prison Industries, Inc.
(i) Treasury Department regulations.

Each of the above regulations of other agencies are specifically referred to in ASPR. No attempt was made to locate or identify regulations issued by other Government agencies that were not specifically mentioned in ASPR.

Use of Commercial Air Transport by the Services

Mr. Mahon. Also the communication from the Transportation Association will be inserted at this point.

(The communication follows:)

Transportation Association of America,
Washington, D.C., April 23, 1959.

Hon. George H. Mahon,
Chairman, Defense Subcommittee of the House Appropriations Committee, House of Representatives, Washington, D.C.

Dear Chairman Mahon: On behalf of the Transportation Association of America, a national organization of transport users, investors, and carriers of all modes, I should like to express its concern about the scope and trend of operations of the Military Air Transport Service and to urge your subcommittee to consider taking further steps to assure that the military services utilize to the maximum extent possible, consistent with actual security requirements, the services of our privately owned and operated air transport fleet.

The highly diversified interests within TAA's membership are united in their thinking about the desirability of maintaining a constant and close check on all commercal-type transport operations of Government agencies. Because our members feel so strongly about the potential dangers of Government competition in the transportation field, the association's board of directors has adopted the following specific policy on the subject:

"Government conduct of carrier operations.—It should be the policy of the Congress that the U.S. Government should not engage in any for-hire transport services where adequate privately owned transportation facilities of any type are or can be made readily available; or, to the extent consistent with national security requirements, engage in any transportation of persons or property which privately owned carriers are fit, willing, and able to peform."

Last year, TAA presented its views on MATS to several congressional committees studying military airlift practices, and we were gratified when Congress voted, in Public Law 85-724, to require that $80 million of the funds available for MATS during fiscal 1959 be used only for the procurement of commercial air service. Unfortunately, we understand that the military will fail to meet this figure by about $13 million.

What is perhaps even more disturbing is the report that MATS, in fiscal 1960, plans to spend about $4 on military airlift for each $1 on commercial airlift, which would compare to a ratio of about $3 to $1 in fiscal 1959.

The military is now requesting funds for procurement of 10 large jet transport aircraft, although it is not clear whether these are to become part of the MATS' fleet. While TAA is not qualified to say whether such jet transports are required in the interest of national security, we do feel we are justified in opposing their procurement if they are to be employed in commercial-type operations that have become so characteristic of MATS.

We urge your subcommittee to continue its watchfulness over operations of MATS, to endorse officially the principle of maximum utilization of civilian air transport by MATS, and to take specific steps—such as earmarking of funds as last year—to see that this principle is implemented.

It would be appreciated if this letter could be inserted into the official record of the hearings your subcommittee is currently conducting on this subject.

Sincerely,

Harold Hammond.

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